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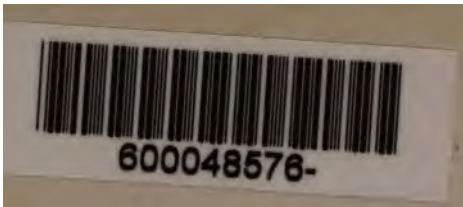
CLARK'S

TRANSIT TABLES

FOR

1885.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TRANSIT TABLES

FOR

1885

GIVING THE GREENWICH MEAN TIME OF THE TRANSIT OF THE SUN, AND OF CERTAIN STARS, FOR EVERY DAY IN THE YEAR

WITH AN EPHEMERIS OF THE SUN, MOON, AND PLANETS

COMPUTED FROM THE NAUTICAL ALMANAC FOR POPULAR USE

BY

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PREFACE.

THE OBJECT of these Transit Tables is to enable anyone to obtain accurate time in any part of the world, by a simple observation of the stars, without any calculation.

They are computed from the 'Nautical Almanac' by the conversion of sidereal into mean time, and they give on the left-hand page the Greenwich time of transit of the Sun and of five of the principal stars for every evening in the year. The tables of 'Additional Stars' on the right-hand page give the times of about twenty other selected stars which south at convenient intervals before midnight. To obtain the time of transit of these latter stars it is necessary to perform a simple addition; using the first of the five stars in the daily list as a datum, it is necessary to add the time placed opposite the 'additional star' to the time of passage of the datum star for the evening in question. The table in fact gives the difference of Right Ascension between the 'additional stars' and the first star on the daily list. It is calculated for a particular evening in each fortnight, but the variations of Right Ascension during this interval are so minute that they may safely be neglected. A

few high southern stars are included in the list for the use of persons residing in the southern hemisphere.

These tables, therefore, enable the observer by mere inspection or by the simplest addition to obtain the mean time of transit of more than twenty stars for every evening in the year.

The times are given to hundredths of a second for the convenience of astronomers who may desire to spare themselves the trouble of computation.

The author's acknowledgments are due to Mr. William J. Harding, of the 'Nautical Almanac' Office, who has kindly revised the whole of the calculations.

In a little work entitled *A Treatise on the Transit Instrument as applied to the Determination of Time, for the Use of Country Gentlemen*,[1] the author has attempted to give a full description of the use of the transit instrument for the purpose above mentioned, and of the method of fixing and adjusting it, and making the necessary calculations and corrections; but the following additional instructions for employing these tables may perhaps be found useful here.

To obtain Local Time in England.

Having fixed our transit instrument so as to point truly to the meridian, or *due south*, by methods which will be described later on, we have only to select any convenient star from the tables, to adjust the index of the declination circle to the altitude given in the tables, and to watch for the star in ques-

[1] *A Treatise on the Transit Instrument, &c.* London, 1882. A. J. Frost, 6 Westminster Chambers. Price 5*s*.

tion. About a minute or so before the time given the star, though frequently invisible to the eye, will be seen to enter the telescope on the right-hand side, and to travel slowly across the field. At the instant that the star crosses the centre wire the correct local time is that given in the tables, and if our watch or clock does not show this time it is by so much too fast or too slow. The Sun will give similar results.

To obtain Greenwich Time.

The result of any transit observation in any part of the world is always to give the local time of the station in question. Before railways were introduced this was the only time employed, and every town in the kingdom had its own local time. As Greenwich time is now, however, universally employed throughout England, we have to add or subtract the difference between our own time and that of Greenwich. We have, in fact, to convert our local time into Greenwich time by making a certain constant correction, which depends on our distance in longitude east or west of Greenwich, and which never changes. This constant (which we of course carry in our memory) is easily obtained once for all by ascertaining the difference of longitude between our station and Greenwich in degrees and minutes, and converting this longitude into time at the rate of *four minutes for each degree, and four seconds for each minute* of longitude. The longitudes will be found written in plain figures on the top and bottom of every ordnance map, thus 2° 2′, which means 2 degrees 2 minutes, and is equal in time to 8 minutes 8 seconds. The

cost of these maps on the one-inch scale is about one shilling.

If the station lie to the West of Greenwich, the difference in time has to be *added to* the times of transit given in the tables.

If the station lie to the East of Greenwich, the difference in time has to be *subtracted from* the times of transit given in the tables.

The result will be Greenwich time. Ipswich, for example, is about 1° 14′ East of Greenwich ; the constant to be subtracted is therefore 4 min. 56 sec. of time. Liverpool is about 3° 4′ West of Greenwich ; the constant to be added is therefore 12 min. 16 sec. of time. Having thus obtained our correction for longitude, it is easy to ascertain the time of transit of the Sun, or of any star at our station. For example, an observer at Liverpool will have to carry in his memory the constant 12 min. 16 sec., thus :—

	H.	M.	S.
Jan. 10, 1884.—Transit of α Andromedæ as per tables	4	43	55
Add correction for W. longitude of Liverpool . .		12	16
Transit at Liverpool in Greenwich time . . .	4	56	11

and these are all the figures required in taking a transit.

In using the list of 'additional stars' we require one more addition ; we take out the time of the 'datum star' for the evening in question (the name of this star is indicated at the head of the list), and we add to it the time opposite the required star, and also our correction for longitude, as in the former case, and the result is the Greenwich time of transit of the star at our station. For example ; to find the transit of α Ceti at Oxford on January 2, 1884 :—

	H.	M.	S.
α Andromedæ (the datum star) transits at Greenwich on Jan. 2, 1884, at	5	15	22
α Ceti (the 'additional' star) has a difference of time to be added	2	53	22
Add constant for longitude of Oxford (1° 15′ 30″ W. of Greenwich) at 4 min. per degree . . .		5	2
Transit of α Ceti at Oxford, in Greenwich time . .	8	13	46

Having thus ascertained the time of transit of any star at our station, the correction of our clock or watch becomes a very simple matter; for example:—

	H.	M.	S.
Jan. 2, 1884.—α Ceti transits at Oxford . . .	8	13	46
But by our watch it passed at	8	12	21
Therefore our watch is slow		1	25

To obtain Local Time in other parts of the World.

These tables are primarily intended for the use of persons living in England, but they will be found equally useful to persons residing in remote or isolatedstations in any part of the world, as, for example, on the Continent, or in America, enabling them by means of the transit instrument to obtain either their own local time or Greenwich time with extreme accuracy and facility. The star tables will give an observer in any part of the world his correct local time, if he adds or subtracts a uniform constant (see page 36 of the Treatise) consisting of the difference between his longitude from Greenwich regarded as sidereal time, and its value converted into mean time by the table given for that purpose at the end of the Treatise. This constant will never exceed two minutes in any part of the world.

Example :—

	H.	M.	S.
Singapore. Longitude 103° 53′ E. at 4 min. per degree	6	55	32·0
The same converted into mean time . . .	6	54	23·92
Difference or constant for Singapore . . .		1	8·08

This difference (which may also be obtained by allowing 9·8296 seconds for each hour of longitude) is a constant value to be *added to* the transit times of the stars as given in the tables, if he lives East of Greenwich, and to be *subtracted* if he lives West ; if his longitude be given in degrees instead of in time, he may obtain the same constant by allowing ·6553 seconds for each degree of longitude.[1] This constant, which we will call the *sidereal constant*, when once ascertained for any locality, never changes, and applies to all stars.

Example :—

Bombay, June 1, 1884.

	H.	M.	S.
June 1, 1884.—α Libræ transits at Greenwich .	10	1	22·35
Add sidereal constant for Bombay, viz. 72° 53′ E. at ·6553 secs. per degree			47·76
α Libræ transits at Bombay in Bombay time .	10	2	10·11

To obtain Greenwich Time at Foreign Stations.

Should he, however, desire to obtain Greenwich time for the purpose of rating ships' chronometers or other uses, he has merely, if his station be West of

[1] Thus 103° 53′ × ·6553 = 1 m. 8·08 secs., as above given. Astronomers only express longitude in time, but the ordinary observer will generally have recourse to a map or atlas, where the longitude is expressed in degrees.

Greenwich, to *add to* the local time thus obtained his longitude from Greenwich stated in time (at the rate of four minutes to each degree), or if his station be East of Greenwich to *subtract it* (see page 8).

Example :—

Gibraltar, May 1, 1884.

	H.	M.	S.
May 1, 1884.—δ Leonis transits at Greenwich .	8	27	18·47
Subtract sidereal constant for Gibraltar 5° 21′ W. at ·6553 secs. per degree			3·50
Local time at Gibraltar	8	27	14·97
Add 5° 21′ W. longitude of Gibraltar, expressed in time		21	24·00
Transit of δ Leonis at Gibraltar in Greenwich time	8	48	38·97

In other words, you add $21^{m}\ 20{\cdot}50^{s}$ to every transit at Gibraltar.

[NOTE.—The Sun's transit may also be employed, but with rather less facility (if very extreme accuracy be required), since, owing to the continual change in the equation of time,[1] it requires a slightly different correction for each day and for each locality. The Sun souths at every place on the globe at twelve o'clock in local time, plus or minus the 'equation of time' *at that instant*. The equation is sometimes increasing and sometimes decreasing; it changes at one period of the year more than a second per hour, so that during the time occupied by the Sun in moving from one meridian to another the equation itself may have varied sensibly. The correction *per hour* is given in the 'Nautical Almanac' for each day at noon, and may be applied in the manner explained in the Treatise, or preferably by the following rules, employing the data contained in the present tables.

For Stations East of Greenwich.—Ascertain the difference between the time of the Sun's southing yesterday and to-day, and multiply this difference in seconds of time by the longitude in degrees, and divide by 360. If the daily equation (or the time of the Sun's southing) be increasing, this correction has to be deducted from the time of southing given in the tables; if decreasing, it has to be added.

For Stations West of Greenwich.—Ascertain the difference between the time of the Sun's southing to-day and to-morrow,

[1] *Treatise on the Transit Instrument*, p. 31.

multiply this difference in seconds by the longitude in degrees, and divide by 360. If the equation, or time of southing, be increasing, the correction has to be added; if decreasing, it has to be subtracted. If a table of these corrections be prepared for the year, it will serve for any future years, and as the changes due to leap year are very minute, a constant for each tenth day will usually suffice.

Example:—

Cape Town, January 2, 1884.

	H.	M.	S
Cape Town, South Africa. Longitude 18° 23′ East			
Jan 1.—Sun souths at Greenwich . . .	12	3	38·26
Jan 2. „ „ „	12	4	6·64
Difference in 24 hours (increasing) . . .			28·38

$$28{\cdot}38 \times \frac{18^\circ\ 23'}{360^\circ} = 1{\cdot}45 \text{ seconds.}$$

Jan. 2.—Sun souths at Greenwich (as per table) .	12	4	6·64
Subtract correction as above			1·45
Sun souths at Cape Town in local time . .	12	4	5·19

It is to be noted that this correction can never, even in the extreme longitude of 180°, exceed ten or twelve seconds, and is usually so insignificant that it may be safely neglected in practice.]

To obtain District Time at Foreign Stations.

The above corrections, when applied to the transits given in the tables, give the true local time at the observer's station, but he may perhaps be living in the neighbourhood of some large city, such as New York or Calcutta, which gives time to the whole district. His case is the same as that of a person living in this country who desires to use Greenwich time.

In such case, after applying the sidereal or solar constants above described which give him *local* time, he will in addition add or subtract the 'correction for longitude' for the required locality, as described in Chapter X. of the Treatise, and at page 8 of this preface.

Example :—

Clifton, U.S.

Clifton 1° 15′ East of New York, U.S. Longitude of New York 74° 0′ W. Longitude of Clifton 72° 45′ W.

	M.	S.
Sidereal constant for Clifton 72° 45′ West, at ·6553 sec. per degree, to be subtracted	0	47·67
Correction for diff. of longitude, New York–Clifton 1° 15′ E. at 4 min. per degree, to be subtracted .	5	0·00
True correction, or constant, for obtaining New York time from transits of stars at Clifton, to be subtracted	5	47·67

In the above instance the *sidereal constant* gives us true local time at Clifton, and the *correction for longitude* converts this into New York time. This calculation is really much simpler than it looks, and when once made is done with for ever. We apply the correction to every star in the tables.

The altitudes of the stars are only given approximately, as they vary with the latitude; the necessary correction may be applied in the manner explained at page 38 of the treatise before mentioned, but the simplest way to make the correction in practice is to slacken the screws which clamp the divided circle on to the axis of the telescope, and, while looking at the star, to turn the circle round till it points correctly to the altitude (or declination) of any known star as given in the tables. It will now point correctly to all other stars, subject to slight errors due to refraction.

The sign of declination of the northern stars, N, is uniformly omitted in the tables, only the S being given. This is done to assist the eye in selecting high and low stars.

Some of the altitudes are marked thus (85° 35′ N.); this means that the altitudes are to be measured from the northern horizon, the instrument and the observer both facing north.

Some of the brighter stars are visible in the telescope by daylight in a clear blue sky; the time of transit of a few of the more important ones is therefore given in footnotes. A little practice is at first necessary to detect them, but when once seen they can be observed more accurately by daylight than by artificial light; it is only necessary to adjust the index to the altitude given in the tables, and at the proper moment the star will be seen crossing the wires, though invisible to the naked eye. The planets Mercury, Venus, and Jupiter are also easily visible by daylight when in favourable positions.

Fixing the Transit Instrument.

As these tables will probably fall into the hands of some who are not acquainted with the transit instrument, it may be well to explain how easily it may be fixed and adjusted. In order to fix the instrument accurately in position in any part of the world, it is only necessary to choose a suitable site facing south, and to point the telescope to the true meridian as nearly as can be guessed, at the same time taking care to adjust the level with extreme accuracy, reversing it end for end. We now note the

times of passage across the centre wire of any two stars given in the tables which differ considerably in their altitude. Assume that the higher star passed correctly at the time stated in the tables, and making the necessary correction for the error of our watch, we see if the low star also passed at the correct time. If it did, which is extremely improbable, our instrument is pointing correctly to the meridian. More probably there will be some error, and the low star appeared to pass either too soon or too late. The correction now necessary is of the simplest character; if the low star passed too soon, the instrument was pointing too much to the east of our meridian; if it passed too late, it was pointing too much to the westward. Before repeating the observation, we require to note some distant object in a line with the centre wire, or preferably to set up some sort of a meridian mark to fix the position; then directing the telescope a little to the eastward or westward as the case may be, we observe another pair of high and low stars, always levelling the instrument with great care and always assuming the high star to give the more correct time. By this means an observer will in two or three evenings have easily adjusted his transit so as to give his time correct to within four or five seconds either with high or low stars, but he must not rest satisfied until he can determine his time by a single observation true to a second, or if employing all three wires, to about half a second.

By far the easiest way to obtain this result is to make use of the tables of 'additional stars,' which are in fact specially designed for this purpose. Let us suppose that some evening in May 1884 we wish to

test the correctness of our meridian; we look at the table of 'additional stars,' in which the low stars are easily recognised by the letter S opposite them in the declination column. We see two stars, ε and β Corvi, which have low altitudes of 15° or 16°, and near these we find several high stars: for example, γ Ursæ Major. and α Canum Venat. Later in the evening we find other low stars, such as α or β Libræ, southing about the same time as β Ursæ Minor. and α Coronæ. We may select any pair of these we choose; for example:—

	Time given in table. H. M. S.
β Ursæ Minor. (a high star)	3 42 31·74
α Libræ (a low star)	3 35 57·11
Difference in time of transit	6 34·63

We learn from this that every evening during the fortnight the low star α Libræ transits 6 min. 34 sec. earlier than the high star β Ursæ Minor. We therefore observe the time of passage of these two stars, but instead of finding the interval 6 min. 34 sec. we perhaps find it only five minutes. Always ascribing the error to the low star, we find that it passed more than a minute *too late*; our mark is therefore too much to the *west*. Supposing this to be at a distance of a hundred yards, we may roughly shift it about a quarter of an inch for each second of error in time, more or less according to its distance from us. If we have any doubt as to the result we can try other stars, or we can take the same pair of stars night after night for the whole fortnight, till we obtain certain proof of the error. By this simple and infallible means we cannot fail to get our meridian rapidly and accurately adjusted, and it is to be

noticed that in doing this we do not require to know anything about our latitude or longitude, or about true time; nor does it matter how much our watch is right or wrong, provided it will keep time correctly during the interval of passage of the two stars.

We have said above that the instrument may in the first instance be directed to the south by guess, but though this is true a more accurate method is preferable. We probably know our longitude, and have approximate Greenwich time. Assume our longitude to be 3° West; in this case we have to add $3 \times 4 = 12$ minutes to every transit given in the tables (see page 8). Choosing any star that we can recognise, we wait for the appointed moment of transit, and at the instant given we direct our instrument exactly to the star. If our level was in adjustment, the instrument will now point to the true meridian.

The star chosen should, if possible, be a very high one, on account of the slowness of motion. If the time of year permit, it should by all means be the Pole Star itself, for it moves so slowly as to give us plenty of time to adjust our instrument with great precision at the first attempt. Most persons will, however, prefer to commence with the Sun, which is perfectly suited to the purpose, and has this great advantage, that having adjusted our instrument by daylight, we are able at once to fix or correct our meridian mark.

If this operation be performed with the most ordinary skill, we may ever after rely on having correct time to a few seconds, but of course we must not be content with our first results.

It will thus be seen that the transit instrument

January 1 to 15.

Mean Time of Transit at Greenwich

1885	The Sun	Sun's Alt.	α Pegasi (*Markab*) 53° 7′	α Andromedæ 66° 59′	α Arietis 61° 26′	α Tauri (*Aldebaran*) 54° 48′	Polaris 52° 47′ (North)
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1. Thur.	12 4 0·3	15 33	4 13 7·7	5 16 22·6	7 14 18·7	9 42 32·7	6 30 55·5
2. Fri.	12 4 28·2	15 39	4 9 11·8	5 12 26·6	7 10 22·8	9 38 36·8	6 26 58·6
3. Sat.	12 4 55·8	15 45	4 5 15·9	5 8 30·7	7 6 26·8	9 34 40·9	6 23 1·6
4. Sun.	12 5 23·0	15 51	4 1 20·0	5 4 34·8	7 2 30·9	9 30 45·0	6 19 4·7
5. Mon.	12 5 49·7	15 58	3 57 24·1	5 0 38·9	6 58 35·0	9 26 49·1	6 15 7·7
6. Tues.	12 6 16·1	16 5	3 53 28·1	4 56 42·9	6 54 39·1	9 22 53·1	6 11 10·8
7. Wed	12 6 41·9	16 12	3 49 32·2	4 52 47·0	6 50 43·1	9 18 57·2	6 7 14·0
8. Thur.	12 7 7·3	16 21	3 45 36·3	4 48 51·1	6 46 47·2	9 15 1·3	6 3 17·2
9. Fri.	12 7 32·2	16 29	3 41 40·4	4 44 55·2	6 42 51·3	9 11 5·4	5 59 20·4
10. Sat.	12 7 56·5	16 38	3 37 44·5	4 40 59·2	6 38 55·4	9 7 9·5	5 55 23·6
11. Sun	12 8 20·2	16 47	3 33 48·5	4 37 3·3	6 34 59·4	9 3 13·6	5 51 26·9
12. Mon.	12 8 43·4	16 57	3 29 52·6	4 33 7·4	6 31 3·5	8 59 17·7	5 47 30·1
13. Tues.	12 9 5·9	17 8	3 25 56·7	4 29 11·5	6 27 7·6	8 55 21·7	5 43 33·3
14. Wed.	12 9 27·8	17 18	3 22 0·8	4 25 15·5	6 23 11·7	8 51 25·8	5 39 36·5
15. Thur.	12 9 49·1	17 29	3 18 4·9	4 21 19·6	6 19 15·7	8 47 29·9	5 35 39·6

January 1 to 15.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

January 1.—Sun sets $3^h\ 59^m$. Day ends $4^h\ 41^m$. Sidereal time at sunset $22^h\ 45^m$.

ag.	Name of Star	Time to be added to Transit of α Pegasi	Altitude	Declination
		h. m. s.	° ′	° ′
2	α Pegasi (*Markab*)	0 0 0·0*	53 7	14 36
^-4	γ Cephei	0 35 30·9	(64 29 N)	77 0
2	α Andromedæ	1 3 14·8	66 59	28 27
3-2	γ Pegasi (*Algenib*)	1 8 6·1	53 4	14 33
3-4	ι Ceti	1 14 20·0	29 4	9 28 S
^-3	α Cassiopeiæ	1 34 42·7	(85 34 N)	55 55
2	β Ceti	1 38 31·0	19 54	18 37 S
2-3	β Andromedæ	2 3 56·4*	73 32	35 1
2	α Ursæ Minor. (*Polaris*)	— — —*	(52 47 N)	88 42
3	θ Ceti	2 18 52·3	29 44	8 47 S
3-2	β Arietis	2 48 48·6	58 46	20 15
2	α Arietis	3 1 10·9*	61 26	22 55
3-4	γ^2 Ceti	3 37 43·9	41 10	2 45
2-3	α Ceti	3 56 36·5	42 9	3 38
2	η Persei	4 16 25·1	87 59	49 27
3	ε Eridani	4 27 46·1	28 40	9 51 S
3	η Tauri	4 40 52·5	62 16	23 45
3	γ^1 Eridani	4 52 51·1	24 41	13 50 S
1	α Tauri (*Aldebaran*)	5 29 25·0*	54 48	10 17
3	ι Aurigæ	5 49 33·0	71 30	32 59
1	α Aurigæ (*Capella*)	6 8 11·7	84 24	45 53
2	β Tauri	6 18 59·3	67 2	28 30
1	α Orionis (*Betelgeuse*)	6 48 49·5	45 54	7 23
1	α Argus (*Canopus*)	7 21 12·1	(South)	52 38 S

Daylight star.—Vega (11 to 12 noon) 77° 12′. Subtract $4^h\ 25^m\ 16{\cdot}8^s$.

The Planets.

Day	Mercury		Venus		Saturn		Neptune	
	Transits P.M.	Alt.	Transits A.M.	Alt.	Transits P.M.	Alt.	Transits P.M.	Alt.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
1	0 27	18 14	9 55	17 42	10 26	60 6	8 29	54 46
3	0 18	18 28	9 57	17 17	10 18	60 6	8 21	54 45
5	A. M.	—	10 0	16 56	10 9	60 5	8 13	54 45
7	11 31	18 40	10 3	16 37	10 1	60 5	8 5	54 45
9	11 14	18 37	10 6	16 20	9 53	60 5	7 57	54 44
11	11 1	18 29	10 8	16 7	9 44	60 4	7 49	54 44
13	10 50	18 17	10 11	15 56	9 36	60 4	7 41	54 44
15	10 41	18 2	10 14	15 47	9 27	60 4	7 33	54 44
17	10 35	17 46	10 17	15 42	9 19	60 4	7 25	54 44
19	10 31	17 29	10 20	15 39	9 11	60 4	7 17	54 43
21	10 29	17 12	10 23	15 39	9 2	60 3	7 9	54 43
23	10 27	16 57	10 26	15 42	8 54	60 3	7 1	54 43
25	10 27	16 45	10 29	15 47	8 46	60 3	6 53	54 43
27	10 28	16 35	10 32	15 56	8 38	60 3	6 45	54 43
29	10 30	16 30	10 35	16 7	8 30	60 3	6 38	54 44
31	10 32	16 28	10 37	16 21	8 22	60 3	6 30	54 44

January 16 to 31.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Cassiopeiæ 85° 34′ (North)	α Tauri (*Aldebaran*) 54° 48′	α Aurigæ (*Capella*) 84° 24′	α Orionis (*Betelgeuse*) 45° 54′	Polaris 52° 47′ (North)
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
16. Fri.	12 10 9·6	17 41	4 48 51·6	8 43 34·0	9 22 20·7	10 2 58·5	5 31 42·7
17. Sat.	12 10 29·5	17 53	4 44 55·6	8 39 38·1	9 18 24·8	9 59 2·6	5 27 45·8
18. Sun.	12 10 48·6	18 5	4 40 59·7	8 35 42·1	9 14 28·8	9 55 6·7	5 23 48·8
19. Mon.	12 11 7·0	18 17	4 37 3·7	8 31 46·2	9 10 32·9	9 51 10·8	5 19 51·8
20. Tues.	12 11 24·6	18 30	4 33 7·8	8 27 50·3	9 6 37·0	9 47 14·9	5 15 54·9
21. Wed.	12 11 41·5	18 44	4 29 11·9	8 23 54·4	9 2 41·1	9 43 19·0	5 11 58·0
22. Thur.	12 11 57·5	18 58	4 25 15·9	8 19 58·5	8 58 45·2	9 39 23·0	5 8 1·1
23. Fri.	12 12 12·8	19 12	4 21 20·0	8 16 2·5	8 54 49·2	9 35 27·1	5 4 4·3
24. Sat.	12 12 27·3	19 26	4 17 24·1	8 12 6·6	8 50 53·3	9 31 31·2	5 0 7·6
25. Sun.	12 12 40·9	19 41	4 13 28·1	8 8 10·7	8 46 57·4	9 27 35·3	4 56 10·9
26. Mon.	12 12 53·7	19 56	4 9 32·2	8 4 14·8	8 43 1·5	9 23 39·4	4 52 14·1
27. Tues.	12 13 5·7	20 12	4 5 36·2	8 0 18·9	8 39 5·5	9 19 43·5	4 48 17·4
28. Wed.	12 13 16·8	20 27	4 1 40·3	7 56 22·9	8 35 9·6	9 15 47·5	4 44 20·6
29. Thur.	12 13 27·2	20 44	3 57 44·4	7 52 27·0	8 31 13·7	9 11 51·6	4 40 23·7
30. Fri.	12 13 36·6	21 0	3 53 48·4	7 48 31·1	8 27 17·8	9 7 55·7	4 36 26·8
31. Sat.	12 13 45·3	21 17	3 49 52·5	7 44 35·2	8 23 21·8	9 3 59·8	4 32 29·9

January 16 to 31.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

January 16.—Sun sets $4^h\ 20^m$. Day ends $5^h\ 1^m$. Sidereal time at sunset $0^h\ 4^m$.

Mag.	Name of Star	Time to be added to Transit of α Cassiopeiæ			Altitude		Declination		
		h.	m.	s.	°	′	°	′	
2–3	α Cassiopeiæ	0	0	0·0*	(85	34 N)	55	55	
2	β Ceti	0	3	48·4	19	54	18	37	S
2–3	β Andromedæ	0	29	13·8	73	32	35	1	
2	α Ursæ Minor. (*Polaris*)	—	—	—*	(52	47 N)	88	42	
3	θ Ceti	0	44	9·7	29	44	8	47	S
3–2	β Arietis	1	14	6·0	58	46	20	15	
2	α Arietis	1	26	28·3	61	20	22	55	
4	ξ^2 Ceti	1	47	46·0	46	28	7	57	
3–4	γ^2 Ceti	2	3	1·3	41	16	2	45	
2–3	α Ceti	2	21	53·9	42	9	3	38	
2	α Persei	2	41	42·5	87	59	49	27	
3	ε Eridani	2	53	3·5	28	40	9	51	S
3	γ^1 Eridani	3	18	8·6	24	41	13	50	S
4	γ Tauri	3	38	40·7	53	52	15	21	
1	α Tauri (*Aldebaran*)	3	54	42·5*	54	48	16	17	
3	ι Aurigæ	4	14	50·5	71	30	32	59	
4–3	ε Leporis	4	25	53·6	15	59	22	32	S
1	α Aurigæ (*Capella*)	4	33	20·2*	84	24	45	53	
2	β Tauri	4	44	16·8	67	2	28	30	
3	α Leporis	4	52	53·2	20	37	17	55	S
3–2	κ Orionis	5	7	20·5	28	48	9	43	S
1	α Orionis (*Betelgeuse*)	5	14	7·1*	45	54	7	23	
2–3	γ Geminorum	5	56	7·7	55	1	16	30	
1	α Canis Major. (*Sirius*)	6	5	6·8	21	57	16	34	S

Daylight star.—Vega (10 to 11 A.M.) 77° 12′. Subtract $5^h\ 59^m\ 59·1^s$.

January.

Mercury, in Sagittarius, is visible in the telescope during the latter part of the month, and may be seen near the S.E. before sunrise. At its greatest distance W. of the Sun on the 26th. Its declination is about 20° S.

Venus, in Scorpio and Sagittarius, is very favourably situated for observation with the transit instrument during this month, and may be seen in the S.E. before sunrise. Its declination varies from 21° S. to 23° S.

Mars, in Capricornus, is not favourably situated for observation during this month. Its declination is about 21° S.

Jupiter, in Leo, transits in the early morning. Near the Moon on the 31st. Its declination is 11° N.

Saturn, between Taurus and Gemini, may be observed at its transit in the evening. Near the Moon on the 26th.

Neptune, between Aries and Taurus, transits about 8^h P.M., and may be observed. Its declination is about 16° N.

At the end of the month Polaris may be observed by daylight.

MOON'S PHASES.

	d.	h.	m.			d.	h.	m.	
Full Moon	1	5	26	A.M.	First Quarter	24	1	26	A.M.
Last Quarter	8	3	37	A.M.	Full Moon	30	4	19	P.M.
New Moon	16	8	37	A.M.					

The evenings from the 1st to the 5th and from the 21st to the 31st are moonlight.

February 1 to 15.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Arietis 61° 26′	α Aurigæ (*Capella*) 84° 24′	α Orionis (*Betelgeuse*) 45° 54′	μ Geminorum 61° 5′	α Canis Major. (*Sirius*) 21° 57′
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1 Sun.	12 13 53·2	21 34	5 12 25·0	8 19 25·9	9 0 3·9	9 27 3·1	9 51 3·7
2. Mon.	12 14 0·2	21 51	5 8 29·1	8 15 30·0	8 56 8·0	9 23 7·2	9 47 7·7
3. Tues.	12 14 6·4	22 9	5 4 33·2	8 11 34·1	8 52 12·0	9 19 11·3	9 43 11·8
4. Wed.	12 14 11·8	22 27	5 0 37·2	8 7 38·1	8 48 16·1	9 15 15·4	9 39 15·9
5. Thur.	12 14 16·5	22 45	4 56 41·3	8 3 42·2	8 44 20·2	9 11 19·5	9 35 20·0
6. Fri.	12 14 20·3	23 4	4 52 45·4	7 59 46·3	8 40 24·3	9 7 23·6	9 31 24·1
7 Sat.	12 14 23·4	23 22	4 48 49·5	7 55 50·4	8 36 28·4	9 3 27·6	9 27 28·1
8. Sun.	12 14 25·6	23 41	4 44 53·5	7 51 54·4	8 32 32·4	8 59 31·7	9 23 32·2
9. Mon.	12 14 27·1	24 1	4 40 57·6	7 47 58·5	8 28 36·5	8 55 35·8	9 19 36·3
10. Tues.	12 14 27·9	24 20	4 37 1·7	7 44 2·6	8 24 40·6	8 51 39·9	9 15 40·4
11. Wed.	12 14 27·9	24 40	4 33 5·8	7 40 6·6	8 20 44·7	8 47 44·0	9 11 44·5
12. Thur.	12 14 27·1	25 0	4 29 9·8	7 36 10·7	8 16 48·8	8 43 48·0	9 7 48·5
13. Fri.	12 14 25·6	25 20	4 25 13·9	7 32 14·8	8 12 52·8	8 39 52·1	9 3 52·6
14. Sat.	12 14 23·3	25 40	4 21 18·0	7 28 18·8	8 8 56·9	8 35 56·2	8 59 56·7
15. Sun.	12 14 20·3	26 1	4 17 22·1	7 24 22·9	8 5 1·0	8 32 0·3	8 56 0·8

February 1 to 15.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

February 1.—Sun sets $4^h\ 46^m$. Day ends $5^h\ 24^m$. Sidereal time at sunset $1^h\ 34^m$.

Mag.	Name of Star	Time to be added to Transit of α Arietis	Altitude	Declination
		h. m. s.	° ′	° ′
2	α Arietis	0 0 0·0*	61 26	22 55
3–4	γ^2 Ceti	0 36 33·0	41 16	2 45
2–3	α Ceti	0 55 25·6	42 9	3 38
2	α Persei	1 15 13·9	87 59	49 27
3	ε Eridani	1 26 35·2	28 40	9 51 S
3	η Tauri	1 39 41·7	62 16	23 45
3	γ^1 Eridani	1 51 40·3	24 41	13 50 S
4	γ Tauri	2 12 12·4	53 52	15 21
1	α Tauri (*Aldebaran*)	2 28 14·2	54 48	16 17
3	ι Aurigæ	2 48 22·2	71 30	32 59
4–3	ε Leporis	2 59 25·3	15 59	22 32 S
1	α Aurigæ (*Capella*)	3 7 0·9*	84 24	45 53
1	β Orionis (*Rigel*)	3 7 49·1	30 11	8 20 S
2	β Tauri	3 17 48·5	67 2	28 30
3	α Leporis	3 26 24·9	20 37	17 55 S
3	ε Orionis	3 29 7·7	37 15	1 17 S
3–2	κ Orionis	3 41 0·8	28 48	9 43 S
1	α Orionis (*Betelgeuse*)	3 47 38·9*	45 54	7 23
3	μ Geminorum	4 14 38·2*	61 5	22 34
1	α Argus (*Canopus*)	4 20 1·2	(South)	52 38 S
2–3	γ Geminorum	4 29 39·6	55 1	16 30
1	α Canis Major. (*Sirius*)	4 38 38·7*	21 57	16 34 S
2–1	ε Canis Majoris	4 52 38·2	9 42	28 49 S
1	α^2 Geminorum (*Castor*)	5 25 42·3	70 40	32 8

Daylight star.—Vega (9 to 10 A.M.) 77° 12′. Subtract $7^h\ 26^m\ 26{\cdot}6^s$.

The Planets.

Day	Mercury		Venus		Jupiter		Saturn	
	Transits A.M.	Alt.	Transits A.M.	Alt.	Transits A.M.	Alt.	Transits P.M.	Alt.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
1	10 33	16 28	10 39	16 29	1 37	50 0	8 17	60 4
3	10 36	16 33	10 42	16 46	1 28	50 5	8 9	60 4
5	10 40	16 42	10 44	17 7	1 19	50 11	8 1	60 4
7	10 43	16 57	10 47	17 30	1 10	50 16	7 53	60 4
9	10 47	17 16	10 50	17 55	1 2	50 22	7 45	60 4
11	10 52	17 40	10 52	18 23	0 53	50 28	7 37	60 5
13	10 56	18 9	10 55	18 54	0 44	50 34	7 29	60 5
15	11 1	18 44	10 57	19 26	0 35	50 39	7 22	60 5
17	11 5	19 24	10 59	20 1	0 26	50 45	7 14	60 6
19	11 10	20 9	11 2	20 38	0 17	50 51	7 6	60 6
21	11 15	21 0	11 4	21 17	0 8	50 57	6 58	60 7
23	11 20	21 56	11 6	21 58	P.M.	—	6 50	60 8
25	11 26	22 57	11 8	22 41	11 46	51 11	6 42	60 8
27	11 31	24 4	11 10	23 26	11 37	51 16	6 35	60 9

February 16 to 28.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	η Tauri 62° 16′	α Tauri (*Aldebaran*) 54° 48′	μ Geminorum 61° 5′	α Canis Major. (*Sirius*) 21° 57′	α^2 Geminorum (*Castor*) 70° 40′
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
16. Mon.	12 14 16·6	26 22	5 53 7·8	6 41 40·4	8 28 4·4	8 52 4·9	9 39 8·5
17. Tues.	12 14 12·1	26 43	5 49 11·9	6 37 44·5	8 24 8·4	8 48 8·9	9 35 12·6
18. Wed.	12 14 7·0	27 4	5 45 16·0	6 33 48·5	8 20 12·5	8 44 13·0	9 31 16·7
19. Thur.	12 14 1·2	27 25	5 41 20·0	6 29 52·6	8 16 16·6	8 40 17·1	9 27 20·7
20. Fri.	12 13 54·7	27 47	5 37 24·1	6 25 56·7	8 12 20·7	8 36 21·2	9 23 24·8
21. Sat.	12 13 47·5	28 9	5 33 28·2	6 22 0·8	8 8 24·8	8 32 25·3	9 19 28·9
22. Sun.	12 13 39·6	28 30	5 29 32·3	6 18 4·8	8 4 28·8	8 28 29·3	9 15 33·0
23. Mon.	12 13 31·2	28 53	5 25 36·3	6 14 8·9	8 0 32·9	8 24 33·4	9 11 37·1
24. Tues.	12 13 22·1	29 15	5 21 40·4	6 10 13·0	7 56 37·0	8 20 37·5	9 7 41·1
25. Wed.	12 13 12·4	29 37	5 17 44·5	6 6 17·1	7 52 41·1	8 16 41·6	9 3 45·2
26. Thur.	12 13 2·1	29 59	5 13 48·5	6 2 21·1	7 48 45·1	8 12 45·6	8 59 49·3
27. Fri.	12 12 51·2	30 22	5 9 52·6	5 58 25·2	7 44 49·2	8 8 49·7	8 55 53·4
28. Sat.	12 12 39·8	30 45	5 5 56·7	5 54 29·3	7 40 53·3	8 4 53·8	8 51 57·5

February 16 to 28.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

February 16.—Sun sets 5^h 15^m. Day ends 5^h 51^m. Sidereal time at sunset 3^h 1^m.

Mag.	Name of Star	Time to be added to Transit of η Tauri			Altitude		Declination		
		h.	m.	s.	°	′	°	′	
3	η Tauri	0	0	0·0*	62	16	23	45	
3	γ^1 Eridani	0	11	58·6	24	41	13	50	S
4	γ Tauri	0	32	30·8	53	52	15	21	
1	α Tauri (*Aldebaran*)	0	48	32·6*	54	48	16	17	
3	ι Aurigæ	1	8	40·5	71	30	32	59	
4–3	ε Leporis	1	19	43·6	15	59	22	32	S
1	α Aurigæ (*Capella*)	1	27	19·2	84	24	45	53	
1	β Orionis (*Rigel*)	1	28	7·4	30	11	8	20	S
2	β Tauri	1	38	6·9	67	2	28	30	
3	α Leporis	1	46	43·3	20	37	17	55	S
3–2	κ Orionis	2	1	19·7	28	48	9	43	S
1	α Orionis (*Betelgeuse*)	2	7	57·3	45	54	7	23	
3	μ Geminorum	2	34	56·6*	61	5	22	34	
1	α Argus (*Canopus*)	2	40	19·4	(South)		52	38	S
2–3	γ Geminorum	2	49	58·0	55	1	16	30	
1	α Canis Major. (*Sirius*)	2	58	57·1*	21	57	16	34	S
2–1	ε Canis Majoris	3	12	56·6	9	42	28	49	S
3–4	δ Geminorum	3	32	2·5	60	43	22	11	
3	β Canis Minoris	3	39	40·7	47	2	8	31	
1	α^2 Geminorum (*Castor*)	3	46	0·7*	70	40	32	8	
1	α Canis Minor. (*Procyon*)	3	52	0·7	44	2	5	31	
1–2	β Geminorum (*Pollux*)	3	56	59·8	66	49	28	18	
3	15 Argus	4	21	18·1	14	33	23	59	S
4–3	β Cancri	4	28	54·6	48	3	9	32	

Daylight star.—Vega (8 to 9 A.M.) 77° 12′. Subtract 9^h 6^m 7·8^s.

February.

Mercury, in Capricornus, is visible in the transit instrument during the first part of this month. Its declination is 22° S. on the 1st, and 18° S. on the 21st.

Venus, in Capricornus, may be observed at its transit by daylight. Its declination is 22° S. on the 1st, and 19° S. on the 16th.

Mars, in Aquarius, is not visible at its transit.

Jupiter, in Leo, transits about midnight, and may be observed with the transit instrument. Near the Moon on the 28th. Its declination is about 12° N.

Saturn, between Taurus and Geminorum, may be well observed at its transit during the evenings of this month. Near the Moon on the 2nd. Its declination is about 22° N.

MOON'S PHASES.

	d.	h.	m.	
Last Quarter	6	10	38	P.M.
New Moon	15	2	22	A.M.
First Quarter	22	10	31	A.M.

The evenings from the 1st to the 3rd and from the 20th to the 28th are moonlight.

March 1 to 15.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Aurigæ (*Capella*) 84° 24′	α Orionis (*Betelgeuse*) 45° 54′	α Canis Major. (*Sirius*) 21° 57′	β Geminorum (*Pollux*) 66° 49′	ε Hydræ 45° 21′
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m s.
1. Sun.	12 12 27·8	31 7	6 29 19·9	7 9 58·1	8 0 57·9	8 59 0·7	10 1 15·0
2. Mon.	12 12 15·4	31 30	6 25 23·9	7 6 2·2	7 57 1·9	8 55 4·8	9 57 19·1
3. Tues.	12 12 2·5	31 53	6 21 28·0	7 2 6·2	7 53 6·0	8 51 8·8	9 53 23·2
4. Wed.	12 11 49·1	32 16	6 17 32·1	6 58 10·3	7 49 10·1	8 47 12·9	9 49 27·2
5. Thur.	12 11 35·3	32 39	6 13 36·1	6 54 14·4	7 45 14·2	8 43 17·0	9 45 31·3
6. Fri.	12 11 21·1	33 3	6 9 40·2	6 50 18·5	7 41 18·2	8 39 21·1	9 41 35·4
7. Sat.	12 11 6·5	33 26	6 5 44·3	6 46 22·5	7 37 22·3	8 35 25·1	9 37 39·5
8. Sun.	12 10 51·6	33 49	6 1 48·3	6 42 26·6	7 33 26·4	8 31 29·2	9 33 43·6
9. Mon.	12 10 36·3	34 13	5 57 52·4	6 38 30·7	7 29 30·5	8 27 33·3	9 29 47·7
10. Tues.	12 10 20·6	34 36	5 53 56·5	6 34 34·8	7 25 34·5	8 23 37·4	9 25 51·7
11. Wed.	12 10 4·7	35 0	5 50 0·5	6 30 38·8	7 21 38·6	8 19 41·5	9 21 55·8
12. Thur.	12 9 48·4	35 23	5 46 4·6	6 26 42·9	7 17 42·7	8 15 45·5	9 17 59·9
13. Fri.	12 9 31·9	35 47	5 42 8·7	6 22 47·0	7 13 46·8	8 11 49·6	9 14 4·0
14. Sat.	12 9 15·1	36 11	5 38 12·7	6 18 51·1	7 9 50·8	8 7 53·7	9 10 8·1
15. Sun.	12 8 58·1	36 34	5 34 16·8	6 14 55·1	7 5 54·9	8 3 57·8	9 6 12·2

March 1 to 15.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

March 1.—Sun sets $5^h\ 37^m$. Day ends $6^h\ 13^m$. Sidereal time at sunset $4^h\ 16^m$.

Mag.	Name of Star	Time to be added to Transit of α Aurigæ	Altitude	Declination
		h. m. s.	° ′	° ′
1	α Aurigæ (*Capella*)	0 0 0·0*	84 24	45 53
2	β Tauri	0 10 47·8	67 2	28 30
3	α Leporis	0 19 24·2	20 37	17 55 S
3–2	κ Orionis	0 34 0·6	28 48	9 43 S
1	α Orionis (*Betelgeuse*)	0 40 38·3*	45 54	7 23
3	μ Geminorum	1 7 37·6	61 5	22 34
1	α Argus (*Canopus*)	1 13 0·1	(South)	52 38 S
2–3	γ Geminorum	1 22 39·0	55 1	16 30
1	α Canis Major. (*Sirius*)	1 31 38·1*	21 57	16 34 S
2–1	ε Canis Majoris	1 45 37·5	9 42	28 49 S
3–4	δ Geminorum	2 4 43·5	60 43	22 11
3	β Canis Minoris	2 12 21·8	47 2	8 31
1	α^2 Geminorum (*Castor*)	2 18 41·8	70 40	32 8
1	α Canis Minoris (*Procyon*)	2 24 41·8	44 2	5 31
1–2	β Geminorum (*Pollux*)	2 29 40·9*	66 49	28 18
4–3	ξ Argus	2 35 50·7	13 57	24 35 S
3	15 Argus	2 53 59·1	14 33	23 59 S
4–3	β Cancri	3 1 35·8	48 3	9 32
6	η Cancri	3 17 20·0	59 21	20 50
3–4	ε Hydræ	3 31 55·3*	45 21	6 50
3	ι Ursæ Majoris	3 42 32·5	87 1	48 29
2	α Hydræ	4 13 3·8	30 21	8 10 S
3	θ Ursæ Majoris	4 16 16·9	(89 17 N)	52 12
3	ε Leonis	4 30 24·1	62 49	24 18

Daylight stars.—Vega (7 to 8 A.M.) 77° 12′. Subtract $10^h\ 33^m\ 26{\cdot}1^s$.
Aldebaran (4.50 to 5.50 P.M.) 54° 48′. Subtract $0^h\ 38^m\ 46{\cdot}5^s$.

The Planets.

Day	Mercury		Venus		Jupiter		Saturn	
	Transits A.M.	Alt.	Transits A.M.	Alt.	Transits P.M.	Alt.	Transits P.M.	Alt.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
1	11 36	25 16	11 12	24 12	11 29	51 22	6 27	60 10
3	11 42	26 33	11 14	25 0	11 20	51 27	6 19	60 10
5	11 47	27 56	11 16	25 49	11 11	51 32	6 12	60 11
7	11 53	29 24	11 17	26 40	11 2	51 37	6 4	60 12
9	11 59	30 57	11 19	27 32	10 53	51 42	5 57	60 13
11	P.M.	—	11 21	28 25	10 45	51 47	5 49	60 14
13	0 11	34 17	11 22	29 19	10 36	51 52	5 42	60 14
15	0 17	36 3	11 23	30 14	10 27	51 56	5 34	60 15
17	0 24	37 53	11 25	31 11	10 19	52 0	5 27	60 16
19	0 30	39 45	11 26	32 8	10 10	52 4	5 19	60 17
21	0 36	41 39	11 28	33 5	10 1	52 7	5 12	60 18
23	0 43	43 33	11 29	34 3	9 53	52 11	5 5	60 19
25	0 49	45 25	11 30	35 2	9 44	52 14	4 57	60 20
27	0 55	47 14	11 31	36 1	9 36	52 17	4 50	60 21
29	1 0	48 58	11 33	37 1	9 28	52 20	4 43	60 23
31	1 4	50 34	11 34	38 0	9 19	52 23	4 35	60 24

March 16 to 31.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Aurigæ (*Capella*) 84° 24′	α Canis Major. (*Sirius*) 21° 57′	β Geminorum (*Pollux*) 66° 49′	ε Hydræ 45° 21′	α Hydræ 30° 21′
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
16. Mon.	12 8 40·9	36 58	5 30 20·9	7 1 59·0	8 0 1·8	9 2 16·2	9 43 24·7
17. Tues.	12 8 23·5	37 22	5 26 24·9	6 58 3·1	7 56 5·9	8 58 20·3	9 39 28·8
18. Wed.	12 8 5·8	37 46	5 22 29·0	6 54 7·1	7 52 10·0	8 54 24·4	9 35 32·9
19. Thur.	12 7 48·0	38 9	5 18 33·1	6 50 11·2	7 48 14·1	8 50 28·5	9 31 37·0
20. Fri.	12 7 30·1	38 33	5 14 37·1	6 46 15·3	7 44 18·1	8 46 32·6	9 27 41·0
21. Sat.	12 7 12·0	38 57	5 10 41·2	6 42 19·4	7 40 22·2	8 42 36·7	9 23 45·1
22. Sun.	12 6 53·8	39 20	5 6 45·3	6 38 23·4	7 36 26·3	8 38 40·7	9 19 49·2
23. Mon.	12 6 35·5	39 44	5 2 49·4	6 34 27·5	7 32 30·4	8 34 44·8	9 15 53·3
24. Tues.	12 6 17·1	40 8	4 58 53·4	6 30 31·6	7 28 34·5	8 30 48·9	9 11 57·4
25. Wed.	12 5 58·7	40 31	4 54 57·5	6 26 35·7	7 24 38·5	8 26 53·0	9 8 1·5
26. Thur.	12 5 40·2	40 55	4 51 1·6	6 22 39·7	7 20 42·6	8 22 57·1	9 4 5·5
27. Fri.	12 5 21·7	41 18	4 47 5·6	6 18 43·8	7 16 46·7	8 19 1·1	9 0 9·6
28. Sat.	12 5 3·2	41 42	4 43 9·7	6 14 47·9	7 12 50·8	8 15 5·2	8 56 13·7
29. Sun.	12 4 44·7	42 5	4 39 13·8	6 10 52·0	7 8 54·8	8 11 9·3	8 52 17·8
30. Mon.	12 4 26·3	42 28	4 35 17·8	6 6 56·0	7 4 58·9	8 7 13·4	8 48 21·9
31. Tues.	12 4 7·9	42 51	4 31 21·9	6 3 0·1	7 1 3·0	8 3 17·5	8 44 26·0

March 16 to 31.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

March 16.—Sun sets $6^h\ 4^m$. Day ends $6^h\ 39^m$. Sidereal time at sunset $5^h\ 41^m$.

Mag.	Name of Star	Time to be added to Transit of α Aurigæ			Altitude		Declination		
		h.	m.	s.	°	′	°	′	
1	α Aurigæ (*Capella*)	0	0	0.0*	84	24	45	53	
1	α Orionis (*Betelgeuse*)	0	40	38·4	45	54	7	23	
3	μ Geminorum	1	7	37·6	61	5	22	34	
1	α Argus(*Canopus*)	1	13	0·0	(South)		52	38	S
2–3	γ Geminorum	1	22	39·1	55	1	16	30	
1	α Canis Major. (*Sirius*)	1	31	38·1*	21	57	16	34	S
2–1	ε Canis Majoris	1	45	37·6	9	42	28	49	S
3–4	δ Geminorum	2	4	43·6	60	43	22	11	
3	β Canis Minoris	2	12	21·9	47	2	8	31	
1	α^2 Geminorum (*Castor*)	2	18	41·8	70	40	32	8	
1	α Canis Minor. (*Procyon*)	2	24	41·9	44	2	5	31	
1–2	β Geminorum (*Pollux*)	2	29	41·0*	66	49	28	18	
4–3	ξ Argus	2	35	50·8	13	57	24	35	S
3	15 Argus	2	53	59·3	14	33	23	59	S
4–3	β Cancri	3	1	35·9	48	3	9	32	
6	η Cancri	3	17	20·1	59	21	20	50	
3–4	ε Hydræ	3	31	55·5*	45	21	6	50	
3	ι Ursæ Majoris	3	42	32·6	87	1	48	29	
5	κ Cancri	3	52	42·1	49	39	11	8	
2	α Hydræ	4	13	3·9*	30	21	8	10	S
3	θ Ursæ Majoris	4	16	17·0	(89	17 N)	52	12	
3	ε Leonis	4	30	24·3	62	49	24	18	
1–2	α Leonis (*Regulus*)	4	53	16·0	51	3	12	31	
2	γ^1 Leonis	5	4	37·2	58	57	20	25	

Daylight star.—Aldebaran (3.50 to 4.50 P.M.) 54° 48′. Subtract $0^h\ 38^m\ 46{\cdot}3^s$.

March.

Mercury, in Aquarius and Pisces, transits by daylight, and may be observed towards the end of the month. Its declination is 13° S. on the 1st, 6° S. on the 11th, and 3° N. on the 21st.

Venus, in Aquarius, is becoming unfavourably situated for observation. Its declination is 14°S. on the 1st, 10° S. on the 11th, and 5° S. on the 21st.

Mars, in Aquarius, transits by daylight, and is not visible.

Jupiter, in Leo, transits about 10^h P.M., and may be well observed with the transit instrument. Near the Moon on the 27th. Its declination is about 13° N.

Saturn, between Taurus and Gemini, may be seen at its transit in the early part of the evening. Near the Moon on the 22nd. Its declination is about 22° N.

A *Partial Eclipse* of the Moon on the 30th, partly visible at Greenwich, commences about 2^h P.M. The following data may be interesting : Middle of the eclipse takes place at $4^h\ 34^m$ P.M. ; last contact with shadow at $6^h\ 10^m$ P.M. ; and last contact with Penumbra at $7^h\ 19^m$ P.M. ; magnitude of eclipse (Moon's diameter = 1) 0·880.

At Greenwich the Moon will rise at $6^h\ 30^m$ P.M., obscured by the Penumbra.

MOON'S PHASES.

	d.	h.	m.			d.	h.	m.	
Full Moon	1	4	0	A.M.	First Quarter	23	5	23	P.M.
Last Quarter	8	6	54	P.M.	Full Moon	30	4	40	P.M.
New Moon	16	5	37	P.M.					

The evenings from the 1st to the 5th and from the 21st to the 31st are moonlight

April 1 to 15.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Canis Major. (*Sirius*) 21° 57′	β Geminorum (*Pollux*) 66° 49′	α Hydræ 30° 21′	α Leonis (*Regulus*) 51° 3′	Polaris, *Lower Transit* 50° 10′ (North)
							Midnight
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1. Wed.	12 3 49·7	43 14	5 59 4·2	6 57 7·1	8 40 30·0	9 20 42·1	12 34 3·8
2. Thur.	12 3 31·6	43 38	5 55 8·3	6 53 11·1	8 36 34·1	9 16 46·2	12 30 7·9
3. Fri.	12 3 13·6	44 0	5 51 12·3	6 49 15·2	8 32 38·2	9 12 50·3	12 26 12·1
4. Sat.	12 2 55·8	44 23	5 47 16·4	6 45 19·3	8 28 42·3	9 8 54·4	12 22 16·2
5. Sun.	12 2 38·2	44 46	5 43 20·5	6 41 23·3	8 24 46·4	9 4 58·5	12 18 20·4
6. Mon.	12 2 20·8	45 9	5 39 24·6	6 37 27·4	8 20 50·4	9 1 2·6	12 14 24·5
7. Tues.	12 2 3·6	45 31	5 35 28·6	6 33 31·5	8 16 54·5	8 57 6·6	12 10 28·6
8. Wed.	12 1 46·6	45 54	5 31 32·7	6 29 35·6	8 12 58·6	8 53 10·7	12 6 32·7
9. Thur.	12 1 30·0	46 16	5 27 36·8	6 25 39·6	8 9 2·7	8 49 14·8	12 2 36·7
10. Fri.	12 1 13·6	46 38	5 23 40·9	6 21 43·7	8 5 6·8	8 45 18·9	11 58 40·7
11. Sat.	12 0 57·5	47 0	5 19 44·9	6 17 47·8	8 1 10·8	8 41 23·0	11 54 44·8
12. Sun.	12 0 41·6	47 22	5 15 49·0	6 13 51·9	7 57 14·9	8 37 27·1	11 50 49·0
13. Mon.	12 0 26·2	47 44	5 11 53·1	6 9 55·9	7 53 19·0	8 33 31·1	11 46 53·2
14. Tues.	12 0 11·0	48 6	5 7 57·2	6 6 0·0	7 49 23·1	8 29 35·2	11 42 57·4
15. Wed.	11 59 56·2	48 27	5 4 1·2	6 2 4·1	7 45 27·1	8 25 39·3	11 39 1·7

April 1 to 15.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

April 1.—Sun sets $6^h\ 29^m$. Day ends $7^h\ 5^m$. Sidereal time at sunset $7^h\ 11^m$.

Mag.	Name of Star	Time to be added to Transit of α Canis Major. h. m. s.	Altitude ° ′	Declination ° ′
1	α Canis Major. (*Sirius*).	0 0 0·0*	21 57	16 34 S
1	α^2 Geminorum (*Castor*) .	0 47 3·7	70 40	32 8
1	α Canis Minor. (*Procyon*)	0 53 3·8	44 2	5 31
1–2	β Geminorum (*Pollux*) .	0 58 3·3*	66 49	28 18
3	15 Argus	1 22 21·1	14 33	23 59 S
4–3	β Cancri . . .	1 29 57·8	48 3	9 32
6	η Cancri . . .	1 45 42·0	59 21	20 50
3–4	ε Hydræ . . .	2 0 17·4	45 21	6 50
3	ι Ursæ Majoris . .	2 10 54·4	87 1	48 29
5	κ Cancri . . .	2 21 4·0	49 39	11 8
2	α Hydræ . . .	2 41 25·9*	30 21	8 10 S
3	θ Ursæ Majoris . .	2 44 38·8	(89 17 N)	52 12
3	ε Leonis . . .	2 58 46·3	62 49	24 18
1–2	α Leonis (*Regulus*). .	3 21 38·0*	51 3	12 31
2	γ^1 Leonis . . .	3 32 59·3	58 57	20 25
4	μ Hydræ . . .	3 39 52·3	22 16	16 15 S
5	*l* Leonis . . .	4 2 29·4	49 40	11 9
2	α Ursæ Majoris . .	4 15 52·2	(79 6 N)	62 22
2–3	δ Leonis . . .	4 27 12·2	59 40	21 9
3–4	δ Crateris . . .	4 32 47·6	24 22	14 10 S
3–4	λ Draconis . . .	4 43 44·6	(71 31 N)	69 58
2	β Leonis . . .	5 2 18·6	53 44	15 13
2–3	γ Ursæ Majoris . .	5 6 53·1	(87 9 N)	54 20
3	ε Corvi	5 23 16·7	16 32	21 59 S
2	α Ursæ Minoris (*Polaris*)	— — —*	(50 10 N)	88 42

Daylight stars.—Capella (3.30 to 4.30 P.M.) 84° 24′. Subtract $1^h\ 31^m\ 38{\cdot}2^s$.
Betelgeuse (4 to 5 P.M.) 45° 54′. Subtract $0^h\ 50^m\ 59{\cdot}7^s$.

The Planets.

Day	Mercury		Venus		Jupiter		Uranus	
	Transits P.M.	Alt.	Transits A.M.	Alt.	Transits P.M.	Alt.	Transits P.M.	Alt.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
1	1 6	51 19	11 34	38 30	9 15	52 24	11 21	39 5
3	1 9	52 42	11 36	39 30	9 7	52 26	11 13	39 7
5	1 11	53 54	11 37	40 29	8 58	52 28	11 4	39 9
7	1 12	54 54	11 38	41 29	8 50	52 29	10 56	39 10
9	1 11	55 42	11 39	42 28	8 42	52 30	10 48	39 12
11	1 9	56 18	11 40	43 27	8 34	52 32	10 40	39 14
13	1 5	56 41	11 42	44 26	8 26	52 33	10 32	39 16
15	0 59	56 51	11 43	45 24	8 18	52 34	10 24	39 18
17	0 52	56 49	11 44	46 22	8 10	52 34	10 15	39 19
19	0 44	56 34	11 46	47 19	8 2	52 34	10 7	39 21
21	0 35	56 7	11 47	48 15	7 54	52 34	9 59	39 23
23	0 24	55 29	11 48	49 10	7 46	52 33	9 51	39 24
25	0 12	54 42	11 50	50 4	7 38	52 33	9 43	39 26
27	A.M.	—	11 51	50 57	7 31	52 32	9 35	39 27
29	11 48	52 52	11 53	51 49	7 23	52 31	0 27	39 28

April 16 to 30.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Canis Major. (*Sirius*) 21° 57′	α Leonis (*Regulus*) 51° 3′	δ Leonis 59° 40′	β Leonis 53° 44′	Polaris, *Lower Transit* 50° 10′ (North)
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
16. Thur.	11 59 41·8	48 48	5 0 5·3	8 21 43·4	9 27 17·5	10 2 24·0	11 35 6·2
17. Fri.	11 59 27·7	49 9	4 56 9·4	8 17 47·5	9 23 21·6	9 58 28·1	11 31 10·6
18. Sat.	11 59 14·0	49 30	4 52 13·5	8 13 51·5	9 19 25·7	9 54 32·1	11 27 15·0
19. Sun.	11 59 0·7	49 51	4 48 17·5	8 9 55·6	9 15 29·8	9 50 36·2	11 23 19·3
20. Mon.	11 58 47·8	50 12	4 44 21·6	8 5 59·7	9 11 33·9	9 46 40·3	11 19 23·7
21. Tues.	11 58 35·4	50 32	4 40 25·7	8 2 3·8	9 7 38·0	9 42 44·4	11 15 28·0
22. Wed.	11 58 23·3	50 52	4 36 29·8	7 58 7·9	9 3 42·0	9 38 48·5	11 11 32·3
23. Thur.	11 58 11·6	51 12	4 32 33·8	7 54 11·9	8 59 46·1	9 34 52·6	11 7 36·6
24. Fri.	11 58 0·4	51 32	4 28 37·9	7 50 16·0	8 55 50·2	9 30 56·7	11 3 40·9
25. Sat.	11 57 49·7	51 51	4 24 42·0	7 46 20·1	8 51 54·3	9 27 0·7	10 59 45·2
26. Sun.	11 57 39·4	52 11	4 20 46·1	7 42 24·2	8 47 58·4	9 23 4·8	10 55 49·6
27. Mon.	11 57 29·7	52 30	4 16 50·1	7 38 28·2	8 44 2·4	9 19 8·9	10 51 54·1
28. Tues.	11 57 20·4	52 49	4 12 54·2	7 34 32·3	8 40 6·5	9 15 13·0	10 47 58·6
29. Wed.	11 57 11·6	53 7	4 8 58·3	7 30 36·4	8 36 10·6	9 11 17·1	10 44 3·2
30. Thur.	11 57 3·4	53 26	4 5 2·4	7 26 40·5	8 32 14·7	9 7 21·2	10 40 7·8

April 16 to 30.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

April 16.—Sun sets $6^h\ 55^m$. Day ends $7^h\ 33^m$. Sidereal time at sunset $8^h\ 34^m$.

Mag.	Name of Star	Time to be added to Transit of α Canis Major. h.	m.	s.	Altitude °	′	Declination °	′
1	α Canis Majoris (*Sirius*).	0	0	0.0*	21	57	16	34 S
2	α Hydræ . . .	2	41	25·9	30	21	8	10 S
3	α Ursæ Majoris . .	2	44	38·7	(89	17 N)	52	12
3	ε Leonis . . .	2	58	46·3	62	49	24	18
1–2	α Leonis (*Regulus*) .	3	21	38·1*	51	3	12	31
2	γ^1 Leonis . . .	3	32	59·3	58	57	20	25
4	μ Hydræ . . .	3	39	52·3	22	16	16	15 S
5	*l* Leonis . . .	4	2	29·5	49	40	11	9
2	α Ursæ Majoris . .	4	15	52·1	(79	6 N)	62	22
2–3	δ Leonis . . .	4	27	12·3*	59	40	21	9
3–4	δ Crateris . . .	4	32	47·7	24	22	14	10 S
3–4	λ Draconis . . .	4	43	44·5	(71	31 N)	69	58
2	β Leonis . . .	5	2	18·7*	53	44	15	13
2–3	γ Ursæ Majoris . .	5	6	53·1	(87	9 N)	54	20
3	ε Corvi	5	23	16·9	16	32	21	59 S
1	α^1 Crucis	5	39	16·2	(South)		62	28 S
2–3	δ^2 Corvi	5	42	55·9	22	39	15	53 S
2–3	β Corvi	5	47	21·1	15	45	22	46 S
3–2	γ^1 Virginis . . .	5	54	48·7	37	42	0	49 S
3	δ Virginis . . .	6	8	45·1	42	33	4	1
3	α Canum Venaticorum .	6	9	35·0	77	28	38	57
3–2	ε Virginis . . .	6	15	22·5	50	6	11	35
2	α Ursæ Minoris (*Polaris*)	—	—	—*	(50	10 N)	88	42
1	α Virginis (*Spica*) .	6	38	0·0	27	58	10	34 S

Daylight stars.—Capella (2.30 to 3.30 P.M.) 84° 24′. Subtract $1^h\ 31^m\ 38{\cdot}2^s$.
Betelgeuse (3 to 4 P.M.) 45° 54′. Subtract $0^h\ 50^m\ 59{\cdot}7^s$.

April.

Mercury, in Aries, is favourably situated for observation with the transit instrument during the first part of the month, and may be seen in the N.W. after sunset. At its greatest distance E. of the Sun on the 8th. Its declination is 13° N. on the 1st, and 18° N. on the 21st.

Venus, in Aries, cannot be seen at its transit during this month. Its declination varies from 0° to 12° N.

Mars, in Aries, is invisible at its transit by daylight. Its declination varies from 0° to 7° N.

Jupiter, in Leo, transits about 8^h P.M., and may be well observed with the transit instrument. Near the Moon on the 23rd. Its declination is about 14° N.

Saturn, between Taurus and Gemini, can scarcely be seen at its transit. Its declination is about 22° N.

Uranus, in Leo, may be observed with the transit instrument before midnight. Its declination is about 1° N.

MOON'S PHASES.

	d.	h.	m.	
Last Quarter	7	2	43	P.M.
New Moon	15	5	51	A.M.
First Quarter	21	11	20	P.M.
Full Moon	29	6	14	A.M

The evenings from the 1st to the 3rd and from the 20th to the 30th are moonlight.

May 1 to 15.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Ursæ Major. 79° 6′ (North)	δ Leonis 59° 40′	β Leonis 53° 44′	β Corvi 15° 45′	Polaris, *Lower Transit* 50° 10′ (North)
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1. Fri.	11 56 55·7	53 44	8 16 58·4	8 28 18·8	9 3 25·2	9 48 27·7	10 36 12·4
2. Sat.	11 56 48·6	54 2	8 13 2·5	8 24 22·8	8 59 29·3	9 44 31·7	10 32 17·1
3. Sun.	11 56 42·0	54 20	8 9 6·5	8 20 26·9	8 55 33·4	9 40 35·8	10 28 21·7
4. Mon.	11 56 36·0	54 37	8 5 10·6	8 16 31·0	8 51 37·5	9 36 39·9	10 24 26·2
5. Tues.	11 56 30·6	54 54	8 1 14·6	8 12 35·1	8 47 41·6	9 32 44·0	10 20 30·8
6. Wed.	11 56 25·7	55 11	7 57 18·7	8 8 39·2	8 43 45·7	9 28 48·1	10 16 35·3
7. Thur.	11 56 21·4	55 27	7 53 22·7	8 4 43·2	8 39 49·7	9 24 52·2	10 12 39·8
8. Fri.	11 56 17·7	55 44	7 49 26·8	8 0 47·3	8 35 53·8	9 20 56·3	10 8 44·3
9. Sat.	11 56 14·6	56 0	7 45 30·9	7 56 51·4	8 31 57·9	9 17 0·3	10 4 48·8
10. Sun.	11 56 12·1	56 15	7 41 34·9	7 52 55·5	8 28 2·0	9 13 4·4	10 0 53·4
11. Mon.	11 56 10·2	56 31	7 37 39·0	7 48 59·6	8 24 6·1	9 9 8·5	9 56 58·1
12. Tues.	11 56 8·9	56 46	7 33 43·0	7 45 3·6	8 20 10·1	9 5 12·6	9 53 2·8
13. Wed.	11 56 8·1	57 1	7 29 47·1	7 41 7·7	8 16 14·2	9 1 16·7	9 49 7·6
14. Thur.	11 56 7·9	57 15	7 25 51·1	7 37 11·8	8 12 18·3	8 57 20·8	9 45 12·4
15. Fri.	11 56 8·3	57 30	7 21 55·2	7 33 15·9	8 8 22·4	8 53 24·8	9 41 17·3

May 1 to 15.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

May 1.—Sun sets $7^h\ 19^m$. Day ends $7^h\ 59^m$. Sidereal time at sunset $9^h\ 59^m$.

Mag.	Name of Star	Time to be added to Transit of α Ursæ Majoris	Altitude	Declination
		h. m. s.	° ′	° ′
2	α Ursæ Majoris	0 0 0.0*	(79 6 N)	62 22
2–3	δ Leonis	0 11 20·6*	59 40	21 9
3–4	δ Crateris	0 16 56·0	24 22	14 10 S
3–4	λ Draconis	0 27 52·2	(71 31 N)	69 58
2	β Leonis	0 46 27·1*	53 44	15 13
2–3	γ Ursæ Majoris	0 51 1·3	(87 9 N)	54 20
4–3	π Virginis	0 58 12·5	45 47	7 15
3	ε Corvi	1 7 25·3	16 32	21 59 S
3–4	η Virginis	1 17 12·0	38 30	0 2 S
1	α^1 Crucis	1 23 24·4	(South)	62 28 S
2–3	δ^2 Corvi	1 27 4·4	22 39	15 53 S
2–3	β Corvi	1 31 29·5*	15 45	22 46 S
3–2	γ^1 Virginis	1 38 57·2	37 42	0 49 S
3	δ Virginis	1 52 53·6	42 33	4 1
3	α Canum Venaticorum	1 53 43·4	77 28	38 56
3–2	ε Virginis	1 59 31·0	50 6	11 35
4–5	θ Virginis	2 7 2·6	33 35	4 56 S
2	α Ursæ Minoris (*Polaris*)	— — —*	(50 10 N)	88 42
1	α Virginis (*Spica*)	2 22 8·5	27 58	10 34 S
3–4	ζ Virginis	2 31 48·8	38 31	0 1 S
2	η Ursæ Majoris	2 45 56·7	88 25	49 53
3	η Bootis	2 52 7·8	57 30	18 58
3–4	α Draconis	3 4 10·0	(76 33 N)	64 56
1	α Bootis (*Arcturus*)	3 13 16·8	58 18	19 47

Daylight stars.—Capella (1.30 to 2.30 P.M.) 84° 24′. Subtract $5^h\ 47^m\ 29{\cdot}9^s$.
Sirius (3 to 4 P.M.) 21° 57′. Subtract $4^h\ 15^m\ 51{\cdot}8^s$.

The Planets.

Day	Mercury		Venus		Jupiter		Uranus	
	Transits A.M.	Alt.	Transits A.M.	Alt.	Transits P.M.	Alt.	Transits P.M.	Alt.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
1	11 36	51 54	11 55	52 40	7 15	52 29	9 19	39 30
3	11 25	51 0	11 56	53 29	7 8	52 28	9 11	39 31
5	11 14	50 10	11 58	54 17	7 0	52 26	9 3	39 32
7	11 4	49 27	P.M.	—	6 52	52 24	8 55	39 34
9	10 55	48 52	0 2	55 48	6 45	52 21	8 47	39 35
11	10 47	48 28	0 4	56 30	6 38	52 19	8 39	39 36
13	10 40	48 13	0 6	57 11	6 30	52 16	8 31	39 36
15	10 35	48 8	0 8	57 50	6 23	52 13	8 23	39 37
17	10 30	48 12	0 11	58 27	6 15	52 10	8 15	39 38
19	10 26	48 26	0 13	59 2	6 8	52 6	8 7	39 39
21	10 23	48 47	0 15	59 34	6 1	52 3	7 59	39 39
23	10 22	49 17	0 18	60 4	5 54	51 59	7 51	39 40
25	10 21	49 53	0 20	60 32	5 47	51 55	7 43	39 40
27	10 20	50 35	0 23	60 57	5 39	51 50	7 35	39 41
29	10 21	51 22	0 25	61 20	5 32	51 46	7 27	39 41
31	10 22	52 14	0 28	61 40	5 25	51 41	7 19	39 41

May 16 to 31.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	ε Corvi 16° 32′	β Corvi 15° 45′	α Can. Ven. 77° 28′	α Virginis (*Spica*) 27° 58′	Polaris, *Lower Transit* 50° 10′ (North)
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
16. Sat.	11 56 9·3	57 43	8 25 24·7	8 49 28·9	9 11 42·8	9 40 7·9	9 37 22·0
17. Sun.	11 56 10·9	57 57	8 21 28·7	8 45 33·0	9 7 46·9	9 36 12·0	9 33 26·9
18. Mon.	11 56 12·9	58 10	8 17 32·8	8 41 37·1	9 3 51·0	9 32 16·1	9 29 31·6
19. Tues.	11 56 15·5	58 23	8 13 36·9	8 37 41·2	8 59 55·0	9 28 20·2	9 25 36·3
20. Wed.	11 56 18·7	58 36	8 9 41·0	8 33 45·2	8 55 59·1	9 24 24·3	9 21 40·9
21. Thur.	11 56 22·3	58 48	8 5 45·1	8 29 49·3	8 52 3·2	9 20 28·4	9 17 45·6
22. Fri.	11 56 26·5	59 0	8 1 49·1	8 25 53·4	8 48 7·3	9 16 32·5	9 13 50·3
23. Sat.	11 56 31·1	59 11	7 57 53·2	8 21 57·5	8 44 11·4	9 12 36·5	9 9 55·0
24. Sun.	11 56 36·3	59 22	7 53 57·3	8 18 1·6	8 40 15·4	9 8 40·6	9 5 59·9
25. Mon.	11 56 42·0	59 33	7 50 1·4	8 14 5·7	8 36 19·5	9 4 44·7	9 2 4·8
26. Tues.	11 56 48·1	59 44	7 46 5·5	8 10 9·7	8 32 23·6	9 0 48·8	8 58 9·7
27. Wed.	11 56 54·7	59 54	7 42 9·5	8 6 13·8	8 28 27·7	8 56 52·9	8 54 14·6
28. Thur.	11 57 1·8	60 3	7 38 13·6	8 2 17·9	8 24 31·7	8 52 57·0	8 50 19·6
29. Fri.	11 57 9·3	60 13	7 34 17·7	7 58 22·0	8 20 35·8	8 49 1·1	8 46 24·6
30. Sat.	11 57 17·3	60 22	7 30 21·8	7 54 26·1	8 16 39·9	8 45 5·1	8 42 29·5
31. Sun.	11 57 25·7	60 30	7 26 25·8	7 50 30·1	8 12 44·0	8 41 9·2	8 38 34·4

May 16 to 31.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

May 16.—Sun sets $7^h\ 44^m$. Day ends $8^h\ 27^m$. Sidereal time at unset $11^h\ 21^m$.

Mag.	Name of Star	Time to be added to Transit of ϵ Corvi			Altitude		Declination		
		h.	m.	s.	°	′	°	′	
3	ϵ Corvi	0	0	0·0*	16	32	21	59	S
3–4	η Virginis	0	9	46·8	38	30	0	2	S
2–3	δ^2 Corvi	0	19	39·1	22	39	15	52	S
2–3	β Corvi	0	24	4·3*	15	45	22	40	S
3–2	γ^1 Virginis	0	31	31·9	37	42	0	49	S
3	δ Virginis	0	45	28·4	42	33	4	1	
3	α Canum Venaticorum	0	46	18·1*	77	28	38	56	
3–2	ϵ Virginis	0	52	5·7	50	6	11	35	
4–5	θ Virginis	0	59	37·3	33	35	4	56	S
2	α Ursæ Minoris (*Polaris*)	—	—	—*	(50	10 N)	88	42	
1	α Virginis (*Spica*)	1	14	43·3*	27	58	10	34	S
3–4	ζ Virginis	1	24	23·6	38	31	0	1	S
2	η Ursæ Majoris	1	38	31·4	88	25	49	53	
3	η Bootis	1	44	42·6	57	30	18	58	
1	β Centauri	1	51	14·6	(South)		59	49	S
4–5	τ Virginis	1	51	16·8	40	37	2	6	
3–4	α Draconis	1	56	44·7	(76	33 N)	64	56	
1	α Bootis (*Arcturus*)	2	5	51·6	58	18	19	47	
4–3	ρ Bootis	2	22	16·3	69	24	30	53	
2–3	ϵ^3 Bootis	2	35	19·7	66	5	27	34	
2–3	α Libræ	2	39	52·7	22	58	15	34	S
2	β Ursæ Minoris	2	46	23·8	(66	51 N)	74	38	
2	β Libræ	3	6	6·4	29	34	8	57	S
2	α Coronæ	3	25	2·9	65	38	27	6	

Daylight stars.—Capella (12.30 to 1.30 P.M.) 84° 24′. Subtract $6^h\ 54^m\ 55{\cdot}0^s$.
Sirius (2 to 3 P.M.) 21° 57′. Subtract $5^h\ 23^m\ 17{\cdot}0^s$.

May.

Mercury, between Aries and Taurus, is very favourably situated for observation with the transit instrument during the latter part of this month, and may be seen in the N.E. before sunrise. At its greatest distance W. of the Sun on the 25th. Its declination is 13° N. on the 1st, and 10° N. on the 21st.

Venus, in Aries and Taurus, cannot be seen at its transit during this month. Its declination varies from 14° N. to 22° N.

Mars, in Aries, is unfavourably situated for observation during this month. Its declination varies from 9° N. to 15° N.

Jupiter, in Leo, may be observed with the transit instrument. Near the Moon on the 20th. Its declination is about 14° N.

Saturn, between Taurus and Gemini, is unfavourably situated for observation during this month. Its declination is about 22° N.

Uranus, in Leo, may be observed at its transit. Its declination is about 1° N.

At the end of the month Polaris may be observed by daylight.

MOON'S PHASES.

	d.	h.	m.			d.	h.	m.	
Last Quarter	7	8	43	A.M.	First Quarter	21	5	45	A.M.
New Moon	14	3	18	P.M.	Full Moon	28	8	31	P.M.

The evenings from the 19th to the 31st are moonlight.

June 1 to 15.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Virginis (*Spica*) 27° 58′	α Bootis (*Arcturus*) 58° 18′	α Libræ 22° 58′	β Libræ 29° 34′	Polaris, *Lower Transit* 50° 10′ (North)
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1. Mon.	11 57 34·5	60 38	8 37 13·3	9 28 21·6	10 2 22·8	10 28 36·5	8 34 39·3
2. Tues.	11 57 43·8	60 46	8 33 17·4	9 24 25·7	9 58 26·8	10 24 40·5	8 30 44·1
3. Wed.	11 57 53·4	60 54	8 29 21·5	9 20 29·8	9 54 30·9	10 20 44·6	8 26 48·9
4. Thur.	11 58 3·4	61 1	8 25 25·6	9 16 33·8	9 50 35·0	10 16 48·7	8 22 53·8
5. Fri.	11 58 13·8	61 7	8 21 29·6	9 12 37·9	9 46 39·1	10 12 52·8	8 18 58·6
6. Sat.	11 58 24·5	61 14	8 17 33·7	9 8 42·0	9 42 43·2	10 8 56·9	8 15 3·5
7. Sun.	11 58 35·5	61 19	8 13 37·8	9 4 46·1	9 38 47·3	10 5 1·0	8 11 8·4
8. Mon.	11 58 46·8	61 25	8 9 41·9	9 0 50·2	9 34 51·4	10 1 5·1	8 7 13·3
9. Tues.	11 58 58·4	61 30	8 5 46·0	8 56 54·3	9 30 55·5	9 57 9·2	8 3 18·4
10. Wed.	11 59 10·3	61 34	8 1 50·0	8 52 58·3	9 26 59·6	9 53 13·3	7 59 23·5
11. Thur.	11 59 22·4	61 39	7 57 54·1	8 49 2·4	9 23 3·6	9 49 17·4	7 55 28·6
12. Fri.	11 59 34·8	61 43	7 53 58·2	8 45 6·5	9 19 7·7	9 45 21·4	7 51 33·6
13. Sat.	11 59 47·3	61 46	7 50 2·3	8 41 10·6	9 15 11·8	9 41 25·5	7 47 38·7
14. Sun.	11 59 59·9	61 49	7 46 6·4	8 37 14·7	9 11 15·9	9 37 29·6	7 43 43·7
15. Mon.	12 0 12·7	61 52	7 42 10·5	8 33 18·7	9 7 20·0	9 33 33·7	7 39 48·6

June 1 to 15.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

June 1.—Sun sets at $8^h\ 4^m$. Day ends $8^h\ 52^m$. Sidereal time at sunset $12^h\ 43^m$.

Mag.	Name of Star	Time to be added to Transit of α Virginis	Altitude	Declination
		h. m. s.	° ′	° ′
1	α Virginis (*Spica*) . .	0 0 0·0*	27 58	10 34 S
3–4	ζ Virginis . . .	0 9 40·2	38 31	0 1 S
2	η Ursæ Majoris . .	0 23 47·9	88 25	49 53
3	η Bootis	0 29 59·3	57 30	18 58
1	β Centauri . . .	0 36 31·1	(South)	59 49 S
4–5	τ Virginis . . .	0 36 33·6	40 37	2 6
3–4	α Draconis . . .	0 42 0·9	(76 33 N)	64 50
1	α Bootis (*Arcturus*) .	0 51 8·3*	58 18	19 47
4–3	ρ Bootis	1 7 33·0	69 24	30 53
1	α^2 Centauri . . .	1 12 29·7	(South)	60 22 S
2–3	ϵ^2 Bootis	1 20 36·4	66 5	27 34
2–3	α Libræ	1 25 9·5*	22 58	15 34 S
2	β Ursæ Minoris . .	1 31 39·8	(66 51 N)	74 38
4–5	ψ Bootis . . .	1 40 6·5	65 55	27 24
2	β Libræ	1 51 23·2*	29 34	8 57 S
2	α Coronæ . . .	2 10 19·7	65 38	27 6
2–3	α Serpentis . . .	2 19 5·6	45 19	6 47
3–4	ε Serpentis . . .	2 25 33·4	43 21	4 50
2	β^1 Scorpii	2 39 11·6	19 2	19 29 S
3	δ Ophiuchi . . .	2 48 43·8	35 8	3 24 S
2	γ Herculis . . .	2 57 13·9	57 57	19 26
1–2	α Scorpii (*Antares*) .	3 2 44·4	12 21	26 11 S
3–2	ζ Ophiuchi . . .	3 11 10·8	28 11	10 20 S
3–2	ζ Herculis . . .	3 17 16·9	70 20	31 49

Daylight stars.—Capella (11.30 to 12.30 P.M.) 84° 24′. Subtract $8^h\ 9^m\ 38{\cdot}0^s$.
Sirius (1 to 2 P.M.) 21° 57′. Subtract $6^h\ 38^m\ 0{\cdot}3^s$.

The Planets.

Day	Mercury		Venus		Jupiter		Saturn	
	Transits A.M.	Alt.	Transits P.M.	Alt.	Transits P.M.	Alt.	Transits P.M.	Alt.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
1	10 24	52 42	0 30	61 49	5 22	51 39	1 0	60 56
3	10 26	53 39	0 32	62 5	5 15	51 34	0 53	60 57
5	10 30	54 39	0 35	62 18	5 8	51 28	0 47	60 57
7	10 34	55 41	0 38	62 28	5 1	51 23	0 40	60 58
9	10 39	56 44	0 41	62 36	4 54	51 18	0 33	60 58
11	10 45	57 46	0 44	62 41	4 47	51 12	0 26	60 59
13	10 52	58 47	0 47	62 43	4 40	51 6	0 20	61 0
15	11 0	59 44	0 49	62 42	4 34	51 0	0 13	61 0
17	11 9	60 38	0 52	62 38	4 27	50 54	0 6	61 0
19	11 19	61 25	0 55	62 32	4 20	50 47	A.M.	—
21	11 29	62 5	0 58	62 22	4 13	50 41	11 53	61 1
23	11 40	62 35	1 1	62 10	4 7	50 34	11 46	61 2
25	11 51	62 55	1 4	61 55	4 0	50 27	11 39	61 2
27	P.M	—	1 6	61 37	3 53	50 19	11 32	61 2
29	0 14	63 2	1 9	61 16	3 47	50 12	11 26	61 3

June 16 to 30.

Mean Time of Transit at Greenwich,

1885	The Sun	Sun's Alt.	α Bootis (*Arcturus*) 58° 18′	α Libræ 22° 58′	β Libræ 29° 34′	α Coronæ 65° 38′	β¹ Scorpii 19° 2′
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
16. Tues.	12 0 25·6	61 54	8 29 22·8	9 3 24·1	9 29 37·8	9 48 34·3	10 17 26·2
17. Wed.	12 0 38·5	61 55	8 25 26·9	8 59 28·2	9 25 41·9	9 44 38·4	10 13 30·3
18. Thur.	12 0 51·5	61 57	8 21 31·0	8 55 32·2	9 21 46·0	9 40 42·5	10 9 34·4
19. Fri.	12 1 4·5	61 58	8 17 35·1	8 51 36·3	9 17 50·0	9 36 46·5	10 5 38·5
20. Sat.	12 1 17·5	61 58	8 13 39·1	8 47 40·4	9 13 54·1	9 32 50·6	10 1 42·6
21. Sun.	12 1 30·5	61 58	8 9 43·2	8 43 44·5	9 9 58·2	9 28 54·7	9 57 46·7
22. Mon.	12 1 43·4	61 58	8 5 47·3	8 39 48·6	9 6 2·3	9 24 58·8	9 53 50·8
23. Tues.	12 1 56·2	61 57	8 1 51·4	8 35 52·7	9 2 6·4	9 21 2·9	9 49 54·9
24. Wed.	12 2 9·0	61 56	7 57 55·5	8 31 56·7	8 58 10·5	9 17 7·0	9 45 59·0
25. Thur.	12 2 21·6	61 55	7 53 59·5	8 28 0·8	8 54 14·5	9 13 11·0	9 42 3·0
26. Fri.	12 2 34·2	61 53	7 50 3·6	8 24 4·9	8 50 18·6	9 9 15·1	9 38 7·1
27. Sat.	12 2 46·5	61 50	7 46 7·7	8 20 9·0	8 46 22·7	9 5 19·2	9 34 11·2
28. Sun.	12 2 58·7	61 48	7 42 11·8	8 16 13·1	8 42 26·8	9 1 23·3	9 30 15·3
29. Mon.	12 3 10·7	61 45	7 38 15·8	8 12 17·1	8 38 30·9	8 57 27·4	9 26 19·4
30. Tues.	12 3 22·5	61 41	7 34 19·9	8 8 21·2	8 34 35·0	8 53 31·5	9 22 23·5

June 16 to 30.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

June 16.—Sun sets $8^h\ 17^m$. Day ends $9^h\ 6^m$. Sidereal time at sunset $13^h\ 57^m$.

Mag.	Name of Star	Time to be added to Transit of α Bootis h. m. s.	Altitude ° ′	Declination ° ′
1	α Bootis (*Arcturus*)	0 0 0.0*	58 18	19 47
4–3	ρ Bootis	0 16 24·8	69 24	30 53
1	α^2 Centauri	0 21 21·4	(South)	60 22 S
2–3	ϵ^2 Bootis	0 29 28·2	66 5	27 34
2–3	α Libræ	0 34 1·3*	22 58	15 34 S
2	β Ursæ Minoris	0 40 31·1	(66 51 N)	74 38
4–5	ψ Bootis	0 48 58·3	65 55	27 24
2	β Libræ	1 0 15·0*	29 34	8 57 S
2	α Coronæ	1 19 11·5*	65 38	27 6
2–3	α Serpentis	1 27 57·4	45 19	6 47
3–4	ϵ Serpentis	1 34 25·2	43 21	4 50
2	β Scorpii	1 48 3·5*	19 2	19 29 S
3	δ Ophiuchi	1 57 35·7	35 8	3 24 S
3	γ Herculis	2 6 5·7	57 57	19 26
1–2	α Scorpii (*Antares*)	2 11 36·2	12 21	26 11 S
3–2	ζ Ophiuchi	2 20 2·6	28 11	10 20 S
3–2	ζ Herculis	2 26 8·7	70 20	31 49
3–4	κ Ophiuchi	2 41 22·7	18 5	9 33
2–3	η Ophiuchi	2 52 54·8	22 57	15 35 S
3–4	α^1 Herculis	2 58 30·7	53 3	14 32
3–4	θ Ophiuchi	3 4 3·0	13 38	24 53 S
5	σ Ophiuchi	3 9 53·2	42 46	4 15
3–2	β Draconis	3 16 53·6	(89 5 N)	52 24
3	β Ophiuchi	3 26 49·4	43 9	4 37

Daylight stars.—Capella (10.30 to 11.30 P.M.) 84° 24′. Subtract $9^h\ 1^m\ 45{\cdot}9^s$.
Sirius (12 to 1 P.M.) 21° 57′. Subtract $7^h\ 29^m\ 8{\cdot}4^s$.

June.

Mercury, in Taurus, is visible at its transit by daylight during the first part of the month. Its declination is 14° N. on the 1st, 19° N. on the 11th, and 24° N. on the 21st.

Venus, in Gemini, is becoming favourably situated for observation, it may be seen in the N.W. after sunset. Its declination is about 24° N.

Mars, between Aries and Taurus, is not visible at its transit. Its declination varies from 17° N. to 21° N.

Jupiter, in Leo, may be observed with the transit instrument during the early part of the evening. Near the Moon on the 17th. Its declination is about 13° N.

Saturn, between Taurus and Gemini, cannot be seen at its transit. Its declination is about 22° N.

MOON'S PHASES.

	d.	h.	m.	
Last Quarter	6	0	5	A.M.
New Moon	12	10	42	P.M.
First Quarter	19	1	49	P.M.
Full Moon	27	11	18	A.M.

The evenings from the 17th to the 30th are moonlight.

July 1 to 15.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Bootis (*Arcturus*) 58° 18′	α Coronæ 65° 38′	β¹ Scorpii 19° 2′	α Scorpii (*Antares*) 12° 21′	ζ Herculis 70° 20′
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1. Wed.	12 3 34·0	61 37	7 30 24·0	8 49 35·5	9 18 27·6	9 42 0·3	10 56 32·8
2. Thur.	12 3 45·4	61 33	7 26 28·1	8 45 39·6	9 14 31·7	9 38 4·4	10 52 36·9
3. Fri.	12 3 56·4	61 28	7 22 32·2	8 41 43·7	9 10 35·7	9 34 8·5	10 48 40·9
4. Sat.	12 4 7·2	61 23	7 18 36·2	8 37 47·8	9 6 39·8	9 30 12·6	10 44 45·0
5. Sun.	12 4 17·6	61 17	7 14 40·3	8 33 51·8	9 2 43·9	9 26 16·7	10 40 49·1
6. Mon.	12 4 27·7	61 11	7 10 44·4	8 29 55·9	8 58 48·0	9 22 20·7	10 36 53·2
7. Tues.	12 4 37·5	61 5	7 6 48·5	8 26 0·0	8 54 52·1	9 18 24·8	10 32 57·3
8. Wed.	12 4 47·0	60 58	7 2 52·5	8 22 4·1	8 50 56·2	9 14 28·9	10 29 1·4
9. Thur.	12 4 56·0	60 51	6 58 56·6	8 18 8·2	8 47 0·2	9 10 33·0	10 25 5·4
10. Fri.	12 5 4·7	60 43	6 55 0·7	8 14 12·2	8 43 4·3	9 6 37·1	10 21 9·5
11. Sat.	12 5 12·9	60 35	6 51 4·8	8 10 16·3	8 39 8·4	9 2 41·2	10 17 13·6
12. Sun.	12 5 20·7	60 27	6 47 8·8	8 6 20·4	8 35 12·5	8 58 45·3	10 13 17·7
13 Mon	12 5 28·1	60 18	6 43 12·9	8 2 24·5	8 31 16·6	8 54 49·3	10 9 21·8
14. Tues.	12 5 34·9	60 9	6 39 17·0	7 58 28·5	8 27 20·7	8 50 53·4	10 5 25·8
15. Wed.	12 5 41·2	60 0	6 35 21·1	7 54 32·6	8 23 24·7	8 46 57·5	10 1 29·9

July 1 to 15.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Bootis (*Arcturus*) 58° 18′	α Coronæ 65° 38′	β¹ Scorpii 19° 2′	α Scorpii (*Antares*) 112° 21′	ζ Herculis 70° 40′
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1. Wed.	12 3 34·0	61 37	7 30 24·0	8 49 35·5	9 18 27·6	9 42 0·3	10 56 32·8
2. Thur.	12 3 45·4	61 33	7 26 28·1	8 45 39·6	9 14 31·7	9 38 4·4	10 52 36·0
3. Fri.	12 3 56·4	61 28	7 22 32·2	8 41 43·7	9 10 35·7	9 34 8·5	10 48 40·9
4. Sat.	12 4 7·2	61 23	7 18 36·2	8 37 47·8	9 6 39·8	9 30 12·6	10 44 45·0
5. Sun.	12 4 17·6	61 17	7 14 40·3	8 33 51·8	9 2 43·9	9 26 16·7	10 40 49·1
6. Mon.	12 4 27·7	61 11	7 10 44·4	8 29 55·9	8 58 48·0	9 22 20·7	10 36 53·2
7. Tues.	12 4 37·5	61 5	7 6 48·5	8 26 0·0	8 54 52·1	9 18 24·8	10 32 57·3
8. Wed.	12 4 47·0	60 58	7 2 52·5	8 22 4·1	8 50 56·2	9 14 28·9	10 29 1·4
9. Thur.	12 4 56·0	60 51	6 58 56·6	8 18 8·2	8 47 0·2	9 10 33·0	10 25 5·4
10. Fri.	12 5 4·7	60 43	6 55 0·7	8 14 12·2	8 43 4·3	9 6 37·1	10 21 9·5
11. Sat.	12 5 12·9	60 35	6 51 4·8	8 10 16·3	8 39 8·4	9 2 41·2	10 17 13·6
12. Sun.	12 5 20·7	60 27	6 47 8·8	8 6 20·4	8 35 12·5	8 58 45·3	10 13 17·7
13 Mon	12 5 28·1	60 18	6 43 12·9	8 2 24·5	8 31 16·6	8 54 49·3	10 9 21·8
14. Tues.	12 5 34·9	60 9	6 39 17·0	7 58 28·5	8 27 20·7	8 50 53·4	10 5 25·8
15. Wed.	12 5 41·2	60 0	6 35 21·1	7 54 32·6	8 23 24·7	8 46 57·5	10 1 29·9

July 1 to 15.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

July 1.—Sun sets $8^h\ 18^m$. Day ends $9^h\ 8^m$. Sidereal time at sunset $14^h\ 58^m$.

Mag.	Name of Star	Time to be added to Transit of α Bootis	Altitude	Declination
		h. m. s.	° ′	° ′
1	α Bootis (*Arcturus*)	0 0 0·0*	58 18	19 47
4–3	ρ Bootis	0 16 24·7	69 24	30 53
1	α^2 Centauri	0 21 21·1	(South)	60 22 S
2–3	ϵ^2 Bootis	0 29 28·2	66 5	27 34
2–3	α Libræ	0 34 1·3	22 58	15 34 S
2	β Ursæ Minoris	0 40 30·1	(66 51 N)	74 38
4–5	ψ Bootis	0 48 58·3	65 55	27 24
2	β Libræ	1 0 15·1	29 34	8 57 S
2	α Coronæ	1 19 11·5*	65 38	27 6
2–3	α Serpentis	1 27 57·5	45 19	6 47
3–4	ε Serpentis	1 34 25·3	43 21	4 50
2	β^1 Scorpii	1 48 3·6*	19 2	19 29 S
3	δ Ophiuchi	1 57 35·8	35 8	3 24 S
3	γ Herculis	2 6 5·9	57 57	19 26
1–2	α Scorpii (*Antares*)	2 11 36·4*	12 21	26 11 S
3–2	ζ Ophiuchi	2 20 2·9	28 11	10 20 S
3–2	ζ Herculis	2 26 8·8*	70 20	31 49
3–4	κ Ophiuchi	2 41 23·0	48 5	9 33
2–3	η Ophiuchi	2 52 55·0	22 57	15 35 S
3–4	α^1 Herculis	2 58 30·9	53 3	14 32
3–4	θ Ophiuchi	3 4 3·3	13 38	24 53 S
5	σ Ophiuchi	3 9 53·5	42 46	4 15
3–2	β Draconis	3 16 53·7	(89 5 N)	52 24
3	ρ Ophiuchi	3 26 49·7	43 9	4 37

Daylight stars.—Capella (9.30 to 10.30 A.M.) 84° 24′. Subtract $9^h\ 0^m\ 45{\cdot}3^s$.
Sirius (11 to 12 noon) 21° 57′. Subtract $7^h\ 29^m\ 8{\cdot}0^s$.
Arcturus (6.30 to 7.30 P.M.). See above.

The Planets.

Day	Mercury		Venus		Jupiter		Saturn	
	Transits P.M.	Alt.	Transits P.M.	Alt.	Transits P.M.	Alt.	Transits A.M.	Alt.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
1	0 25	62 48	1 12	60 53	3 40	50 5	11 19	61 3
3	0 35	62 24	1 14	60 27	3 33	49 57	11 12	61 3
5	0 45	61 51	1 16	59 59	3 27	49 50	11 5	61 3
7	0 54	61 9	1 19	59 28	3 20	49 42	10 59	61 3
9	1 3	60 19	1 21	58 55	3 14	49 34	10 52	61 3
11	1 11	59 24	1 23	58 20	3 7	49 27	10 45	61 3
13	1 18	58 23	1 26	57 42	3 1	49 19	10 38	61 3
15	1 24	57 18	1 28	57 2	2 54	49 10	10 31	61 3
17	1 30	56 10	1 30	56 21	2 48	49 2	10 24	61 3
19	1 34	54 59	1 31	55 37	2 41	48 54	10 18	61 3
21	1 38	53 46	1 33	54 51	2 35	48 45	10 11	61 3
23	1 42	52 32	1 35	54 4	2 29	48 36	10 4	61 3
25	1 45	51 18	1 37	53 15	2 22	48 28	9 57	61 3
27	1 47	50 4	1 38	52 25	2 16	48 19	9 50	61 3
29	1 49	48 50	1 40	51 33	2 9	48 10	9 44	61 2
31	1 50	47 38	1 41	50 40	2 3	48 1	9 37	61 2

July 16 to 31.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Bootis (*Arcturus*) 58° 18′	α Scorpii (*Antares*) 12° 21′	ζ Herculis 70° 20′	α Ophiuchi 51° 10′	α Lyræ (*Vega*) 77° 12′
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
16. Thur.	12 5 47·1	59 50	6 31 25·1	8 43 1·6	8 57 34·0	9 50 4·4	10 53 21·1
17. Fri.	12 5 52·3	59 40	6 27 29·2	8 39 5·7	8 53 38·1	9 46 8·5	10 49 25·2
18. Sat.	12 5 57·1	59 29	6 23 33·3	8 35 9·8	8 49 42·2	9 42 12·6	10 45 29·3
19. Sun.	12 6 1·2	59 19	6 19 37·4	8 31 13·8	8 45 46·2	9 38 16·7	10 41 33·4
20. Mon.	12 6 4·9	59 7	6 15 41·4	8 27 17·9	8 41 50·3	9 34 20·8	10 37 37·5
21. Tues.	12 6 7·9	58 56	6 11 45·5	8 23 22·0	8 37 54·4	9 30 24·8	10 33 41·6
22. Wed.	12 6 10·4	58 44	6 7 49·6	8 19 26·1	8 33 58·5	9 26 28·9	10 29 45·6
23. Thur.	12 6 12·2	58 32	6 3 53·7	8 15 30·2	8 30 2·5	9 22 33·0	10 25 49·7
24. Fri.	12 6 13·5	58 19	5 59 57·7	8 11 34·2	8 26 6·6	9 18 37·1	10 21 53·8
25. Sat.	12 6 14·2	58 6	5 56 1·8	8 7 38·3	8 22 10·7	9 14 41·2	10 17 57·9
26. Sun.	12 6 14·3	57 53	5 52 5·9	8 3 42·4	8 18 14·8	9 10 45·3	10 14 2·0
27. Mon.	12 6 13·8	57 39	5 48 10·0	7 59 46·5	8 14 18·8	9 6 49·3	10 10 6·1
28. Tues.	12 6 12·7	57 26	5 44 14·0	7 55 50·6	8 10 22·9	9 2 53·4	10 6 10·1
29. Wed.	12 6 11·0	57 11	5 40 18·1	7 51 54·6	8 6 27·0	8 58 57·5	10 2 14·2
30. Thur.	12 6 8·7	56 57	5 36 22·2	7 47 58·7	8 2 31·1	8 55 1·6	9 58 18·3
31. Fri.	12 6 5·8	56 42	5 32 26·3	7 44 2·8	7 58 35·1	8 51 5·7	9 54 22·4

July 16 to 31.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

July 16.—Sun sets $8^h\ 8^m$. Day ends $8^h\ 54^m$. Sidereal time at sunset $15^h\ 46^m$.

Mag.	Name of Star	Time to be added to Transit of α Bootis h. m. s.	Altitude ° ′	Declination ° ′
1	α Bootis (*Arcturus*)	0 0 0·0*	58 18	19 47
3	δ Ophiuchi	1 57 35·9	35 8	3 24 S
3	γ Herculis	2 6 5·9	57 57	19 26
1–2	α Scorpii (*Antares*)	2 11 36·5*	12 21	26 11 S.
3–2	ζ Ophiuchi	2 20 2·9	28 11	10 ·20 S
3–2	ζ Herculis	2 26 8·9*	70 20	31 49
3–4	κ Ophiuchi	2 41 23·0	48 5	9 33
2–3	η Ophiuchi	2 52 55·1	22 57	15 35 S
3–4	α′ Herculis	2 58 31·0	53 3	14 32
3–4	θ Ophiuchi	3 4 3·4	13 38	24 53 S
5	σ Ophiuchi	3 9 53·6	42 46	4 15
3–2	β Draconis	3 16 53·7	(89 5 N)	52 24
2	α Ophiuchi	3 18 39·3*	51 10	12 39
3	β Ophiuchi	3 26 49·8	43 9	4 37
3–4	μ Herculis	3 30 58·9	66 19	27 48
2–3	γ Draconis	3 42 55·7	(89 58 N)	51 30
4	μ Sagittarii	3 55 51·2	17 26	21 5 S
3	η Serpentis	4 4 17·9	35 36	2 55 S
3	λ Sagittarii	4 9 48·3	13 2	25 29 S
1	α Lyræ (*Vega*)	4 21 56·0*	77 12	38 41
4	β Lyræ	4 34 41·3	71 46	33 14
3	ζ Aquilæ	4 48 56·4	52 13	13 42
3–4	δAquilæ	5 8 27·9	41 25	2 54
3	γ Aquilæ	5 29 30·0	48 52	10 20

Daylight stars.—Capella (8.30 to 9.30 A.M.) 84° 24′. Subtract $9^h\ 0^m\ 44{\cdot}8^s$.
Sirius (10 to 11 A.M.) 21° 57′. Subtract $7^h\ 29^m\ 7{\cdot}7^s$.
Arcturus (5.30 to 6.30 P.M.). See above.

July.

Mercury, in Gemini and Cancer, may be observed in the transit instrument during this month. Its declination is 24° N. on the 1st, 21° N. on the 11th, and 15° N. on the 21st.

Venus, in Cancer, is visible at its transit by daylight. Its declination is 22° N. on the 1st, 20° N. on the 11th, and 16° N. on the 21st.

Mars, in Taurus, is unfavourably situated for observation during this month. Its declination is about 23° N.

Jupiter, in Leo, may be observed at its transit in the afternoon. Near the Moon on the 14th. Its declination is about 11° N.

Saturn cannot be seen at its transit. Its declination is about 23° N.

MOON'S PHASES.

	d.	h.	m.	
Last Quarter	5	0	26	P.M.
New Moon	12	5	16	A.M.
First Quarter	19	0	20	A.M.
Full Moon	27	2	23	A.M.

The evenings from the 17th to the 31st are moonlight.

August 1 to 15.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Bootis (*Arcturus*) 58° 18′	α¹ Herculis 53° 3′	η Serpentis 35° 36′	α Lyræ (*Vega*) 77° 12′	ζ Aquilæ 52° 13′
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1. Sat.	12 6 2·3	56 27	5 28 30·4	8 27 1·4	9 32 48·4	9 50 26·5	10 17 27·0
2. Sun.	12 5 58·2	56 12	5 24 34·4	8 23 5·5	9 28 52·5	9 46 30·5	10 13 31·0
3. Mon.	12 5 53·5	55 56	5 20 38·5	8 19 9·6	9 24 56·6	9 42 34·6	10 9 35·1
4. Tues.	12 5 48·3	55 40	5 16 42·6	8 15 13·7	9 21 0·7	9 38 38·7	10 5 39·2
5. Wed.	12 5 42·5	55 24	5 12 46·7	8 11 17·7	9 17 4·8	9 34 42·8	10 1 43·3
6. Thur.	12 5 36·1	55 7	5 8 50·7	8 7 21·8	9 13 8·9	9 30 46·9	9 57 47·4
7. Fri.	12 5 29·2	54 51	5 4 54·8	8 3 25·9	9 9 12·9	9 26 50·9	9 53 51·5
8. Sat.	12 5 21·6	54 34	5 0 58·9	7 59 30·0	9 5 17·0	9 22 55·0	9 49 55·6
9. Sun.	12 5 13·6	54 16	4 57 3·0	7 55 34·0	9 1 21·1	9 18 59·1	9 45 59·6
10. Mon.	12 5 4·9	53 59	4 53 7·0	7 51 38·1	8 57 25·2	9 15 3·2	9 42 3·7
11. Tues.	12 4 55·6	53 41	4 49 11·1	7 47 42·2	8 53 29·3	9 11 7·3	9 38 7·8
12. Wed.	12 4 45·8	53 23	4 45 15·2	7 43 46·3	8 49 33·4	9 7 11·3	9 34 11·9
13. Thur.	12 4 35·5	53 5	4 41 19·3	7 39 50·4	8 45 37·4	9 3 15·4	9 30 16·0
14. Fri.	12 4 24·5	52 46	4 37 23·3	7 35 54·4	8 41 41·5	8 59 19·5	9 26 20·1
15. Sat.	12 4 13·1	52 27	4 33 27·4	7 31 58·5	8 37 45·6	8 55 23·6	9 22 24·1

August 1 to 15.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

August 1.—Sun sets $7^h\ 46^m$. Day ends $8^h\ 29^m$. Sidereal time at sunset $16^h\ 28^m$.

Mag.	Name of Star	Time to be added to Transit of α Bootis	Altitude	Declination
		h. m. s.	° ′	° ′
1	α Bootis (*Arcturus*) .	0 0 0·0*	58 18	19 47
3–2	ζ Herculis . . .	2 26 8·8	70 20	31 49
3–4	κ Ophiuchi . . .	2 41 23·1	48 5	9 33
2–3	η Ophiuchi . . .	2 52 55·3	22 57	15 35 S
3–4	α¹ Herculis . . .	2 58 31·1*	53 3	14 32
3–4	θ Ophiuchi . . .	3 4 3·5	13 38	24 53 S
5	σ Ophiuchi . . .	3 9 53·8	42 46	4 15
3–2	β Draconis . . .	3 16 53·5	(89 5 N)	52 24
3	β Ophiuchi . . .	3 26 50·0	43 9	4 37
2–3	γ Draconis . . .	3 42 55·0	(89 58 N)	51 30
4	μ Sagittarii . . .	3 55 51·4	17 26	21 5 S
3	η Serpentis . . .	4 4 18·1*	35 36	2 55 S
3	λ Sagittarii . . .	4 9 48·6	13 2	25 29 S
1	α Lyræ (*Vega*) .	4 21 56·1*	77 12	38 41
4	β¹ Lyræ	4 34 41·5	71 46	33 14
3	ζ Aquilæ . . .	4 48 56·7*	52 13	13 42
3–4	δ Aquilæ . . .	5 8 28·2	41 25	2 54
3	γ Aquilæ . . .	5 29 30·3	48 52	10 20
1–2	α Aquilæ (*Altair*) . .	5 33 52·4	47 6	8 34
3	θ Aquilæ . . .	5 54 1·1	37 22	1 9 S
3–4	α² Capricorni . .	6 0 18·3	25 38	12 54 S
2	α Pavonis . . .	6 5 11·2	(South)	57 6 S
4	ε Delphini . . .	6 16 18·3	49 26	10 55
2–1	α Cygni . . .	6 26 4·5	83 24	44 53

Daylight stars.—Capella (7.30 to 8.30 A.M.) 84° 24′. Subtract $9^h\ 0^m\ 43{\cdot}8^s$.
Sirius (9 to 10 A.M.) 21° 57′. Subtract $7^h\ 29^m\ 7{\cdot}1^s$.
Arcturus (4.30 to 5.30 P.M.). See above.

The Planets.

Day	Mercury		Venus		Jupiter		Saturn	
	Transits P.M.	Alt.	Transits P.M.	Alt.	Transits P.M.	Alt.	Transits A.M.	Alt.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
1	1 50	47 3	1 42	50 13	2 0	47 56	9 33	61 2
3	1 50	45 53	1 43	49 18	1 53	47 47	9 26	61 2
5	1 49	44 47	1 44	48 21	1 47	47 38	9 20	61 1
7	1 48	43 43	1 46	47 24	1 41	47 29	9 13	61 1
9	1 45	42 44	1 47	46 26	1 34	47 19	9 6	61 1
11	1 42	41 50	1 48	45 27	1 28	47 10	8 59	61 0
13	1 38	41 2	1 49	44 27	1 22	47 0	8 52	61 0
15	1 33	40 20	1 50	43 27	1 16	46 51	8 45	61 0
17	1 27	39 48	1 51	42 26	1 9	46 41	8 38	60 59
19	1 20	39 25	1 52	41 25	1 3	46 31	8 31	60 59
21	1 11	39 12	1 53	40 23	0 57	46 22	8 24	60 58
23	1 1	39 12	1 54	39 21	0 50	46 12	8 17	60 58
25	0 50	39 26	1 55	38 19	0 44	46 2	8 10	60 57
27	0 38	39 53	1 55	37 17	0 38	45 52	8 2	60 57
29	0 24	40 34	1 56	36 15	0 32	45 42	7 55	60 57
31	0 10	41 27	1 57	35 13	0 25	45 32	7 48	60 56

August 16 to 31.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Bootis (*Arcturus*) 58° 18′	α Ophiuchi 51° 10′	α Lyræ (*Vega*) 77° 12′	ζ Aquilæ 52° 13′	α Aquilæ (*Altair*) 47° 6′
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
16. Sun.	12 4 1·0	52 8	4 29 31·5	7 48 10·9	8 51 27·6	9 18 28·2	10 3 24·0
17. Mon.	12 3 48·5	51 49	4 25 35·6	7 44 15·0	8 47 31·7	9 14 32·3	9 59 28·1
18. Tues.	12 3 35·4	51 30	4 21 39·7	7 40 19·1	8 43 35·8	9 10 36·4	9 55 32·2
19. Wed.	12 3 21·8	51 10	4 17 43·7	7 36 23·2	8 39 39·9	9 6 40·5	9 51 36·2
20. Thur.	12 3 7·8	50 51	4 13 47·8	7 32 27·3	8 35 43·9	9 2 44·6	9 47 40·3
21. Fri.	12 2 53·2	50 31	4 9 51·9	7 28 31·3	8 31 48·0	8 58 48·6	9 43 44·4
22. Sat.	12 2 38·2	50 10	4 5 56·0	7 24 35·4	8 27 52·1	8 54 52·7	9 39 48·5
23. Sun.	12 2 22·7	49 50	4 2 0·0	7 20 39·5	8 23 56·2	8 50 56·8	9 35 52·6
24. Mon.	12 2 6·8	49 30	3 58 4·1	7 16 43·6	8 20 0·2	8 47 0·9	9 31 56·7
25. Tues.	12 1 50·4	49 9	3 54 8·2	7 12 47·6	8 16 4·3	8 43 5·0	9 28 0·8
26. Wed.	12 1 33·7	48 48	3 50 12·3	7 8 51·7	8 12 8·4	8 39 9·0	9 24 4·8
27. Thur.	12 1 16·5	48 27	3 46 16·4	7 4 55·8	8 8 12·4	8 35 13·1	9 20 8·9
28. Fri.	12 0 59·0	48 6	3 42 20·4	7 0 59·9	8 4 16·5	8 31 17·2	9 16 13·0
29. Sat.	12 0 41·2	47 45	3 38 24·5	6 57 3·9	8 0 20·6	8 27 21·3	9 12 17·1
30. Sun.	12 0 23·0	47 23	3 34 28·6	6 53 8·0	7 56 24·7	8 23 25·4	9 8 21·2
31. Mon.	12 0 4·6	47 1	3 30 32·7	6 49 12·1	7 52 28·7	8 19 29·5	9 4 25·3

August 16 to 31.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

August 16.—Sun sets 7^h 19^m. Day ends 7^h 58^m. Sidereal time at sunset 16^h 59^m.

Mag.	Name of Star	Time to be added to Transit of α Bootis h.	m.	s.	Altitude °	′	Declination °	′
1	α Bootis (*Arcturus*)	0	0	0·0*	58	18	19	47
3–4	θ Ophiuchi	3	4	3·5	13	38	24	53 S
5	σ Ophiuchi	3	9	53·8	42	46	4	15
3–2	β Draconis	3	16	53·4	(89	5 N)	52	14
2	α Ophiuchi	3	18	39·4*	51	10	12	39
3	β Ophiuchi	3	26	50·0	43	9	4	37
3–4	μ Herculis	3	30	59·0	66	19	27	48
2–3	γ Draconis	3	42	55·5	(89	58 N)	51	30
4	μ Sagittarii	3	55	51·5	17	26	21	5 S
3	η Serpentis	4	4	18·2	35	36	2	55 S
3	λ Sagittarii	4	9	48·6	13	2	25	29 S
1	α Lyræ (*Vega*)	4	21	56·1*	77	12	38	41
4	β′ Lyræ	4	34	41·5	71	46	33	14
3	ζ Aquilæ	4	48	56·7*	52	13	13	42
3–4	δ Aquilæ	5	8	28·3	41	25	2	54
3	γ Aquilæ	5	29	30·4	48	52	10	20
1–2	α Aquilæ (*Altair*)	5	33	52·5*	47	6	8	34
3	θ Aquilæ	5	54	1·2	37	22	1	9 S
3–4	α^2 Capricorni	6	0	18·5	25	38	12	54 S
2	α Pavonis	6	5	11·3	(South)		57	6 S
4	ε Delphini	6	16	18·4	49	26	10	55
2–1	α Cygni	6	26	4·7	83	24	44	53
4	θ Capricorni	6	47	59·2	20	50	17	41 S
3	ζ Cygni	6	56	31·4	68	17	29	46

Daylight stars.—Capella (6.30 to 7.30 A.M.) 84° 24′. Subtract 9^h 0^m 43^s·3.
Sirius (8 to 9 A.M.) 21° 57′. Subtract 7^h 29^m 6^s·7.
Arcturus (3.30 to 4.30 P.M.). See above.

August.

Mercury, in Leo, is very favourably situated for observation at its transit by daylight during this month; may be seen in the W. after sunset. At its greatest distance E. of the Sun on the 6th. Its declination is 9° N. on the 1st, 3° N. on the 11th, and 1° S. on the 21st.

Venus, in Leo, may be seen in the transit instrument about 2^h P.M. Its declination is 12° N. on the 1st, 7° N. on the 11th, and 2° N. on the 21st.

Mars, in Gemini, is not visible in the telescope at its transit about 9^h A.M. Its declination is about 24° N.

Jupiter, in Leo, transits near the Sun, and is becoming unfavourably situated for observation. Its declination is about 8° N.

Saturn, in Gemini, is not visible at its transit by daylight. Its declination is about 22° N.

MOON'S PHASES.

	d.	h.	m.	
Last Quarter	3	9	55	P.M.
New Moon	10	0	14	P.M.
First Quarter	17	1	47	P.M.
Full Moon	25	5	25	P.M.

The evenings from the 15th to the 31st are moonlight.

September 1 to 15.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Bootis (*Arcturus*) 58° 18′	λ Sagittarii 13° 2′	α Lyræ (*Vega*) 77° 12′	α Aquilæ (*Altair*) 47° 6′	ζ Cygni 68° 17′
	h. m. s.	° ′	h. m. s.	h. m. s	h. m. s.	h. m. s.	h. m s.
1. Tues.	11 59 45·8	46 40	3 26 36·3	7 36 25·4	7 48 32·8	9 0 29·3	10 23 8·3
2. Wed.	11 59 26·8	46 18	3 22 40·8	7 32 29·4	7 44 36·9	8 56 33·4	10 19 12·4
3. Thur.	11 59 7·5	45 56	3 18 44·9	7 28 33·5	7 40 40·9	8 52 37·5	10 15 16·5
4. Fri.	11 58 48·0	45 34	3 14 49·0	7 24 37·6	7 36 45·0	8 48 41·6	10 11 20·5
5. Sat.	11 58 28·3	45 11	3 10 53·1	7 20 41·7	7 32 49·1	8 44 45·7	10 7 24·6
6. Sun.	11 58 8·3	44 49	3 6 57·2	7 16 45·7	7 28 53·2	8 40 49·8	10 3 28·7
7. Mon.	11 57 48·2	44 26	3 3 1·2	7 12 49·8	7 24 57·2	8 36 53·8	9 59 32·8
8. Tues.	11 57 27·9	44 4	2 59 5·3	7 8 53·9	7 21 1·3	8 32 57·9	9 55 36·9
9. Wed.	11 57 7·4	43 41	2 55 9·4	7 4 58·0	7 17 5·4	8 29 2·0	9 51 41·0
10. Thur.	11 56 46·8	43 18	2 51 13·5	7 1 2·0	7 13 9·4	8 25 6·1	9 47 45·1
11. Fri.	11 56 26·1	42 56	2 47 17·6	6 57 6·1	7 9 13·5	8 21 10·2	9 43 49·1
12. Sat.	11 56 5·2	42 33	2 43 21·6	6 53 10·2	7 5 17·6	8 17 14·3	9 39 53·2
13. Sun.	11 55 44·2	42 10	2 39 25·7	6 49 14·3	7 1 21·6	8 13 18·3	9 35 57·3
14. Mon.	11 55 23·2	41 47	2 35 29·8	6 45 18·3	6 57 25·7	8 9 22·4	9 32 1·4
15. Tues.	11 55 2·1	41 23	2 31 33·9	6 41 22·4	6 53 29·8	8 5 26·5	9 28 5·5

September 1 to 15.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

Sept. 1.—Sun sets ^{h} 45^{m}. Day ends 7^{h} 22^{m}. Sidereal time at sunset 17^{h} 28^{m}.

Mag.	Name of Star	Time to be added to Transit of α Bootis	Altitude	Declination
		h. m. s.	° ′	° ′
1	α Bootis (*Arcturus*)	0 0 0·0*	58 18	19 47
3–4	μ Herculis	3 30 58·9	66 19	27 48
2–3	γ Draconis	3 42 55·2	(89 58 N)	51 30
4	μ Sagittarii	3 55 51·5	17 26	21 5 S
3	η Serpentis	4 4 18·2	35 36	2 55 S
3	λ Sagittarii	4 9 48·6*	13 2	25 29 S
1	α Lyræ (*Vega*)	4 21 56·0*	77 12	38 41
4	β^{1} Lyræ	4 34 41·4	71 46	33 14
3	ζ Aquilæ	4 48 56·8	52 13	13 42
3–4	δ Aquilæ	5 8 28·3	41 25	2 54
3	γ Aquilæ	5 29 30·5	48 52	10 20
1–2	α Aquilæ (*Altair*)	5 33 52·6*	47 6	8 34
3	υ Aquilæ	5 54 1·4	37 22	1 9 S
3–4	α^{2} Capricorni	6 0 18·6	25 38	12 54 S
2	α Pavonis	6 5 11·4	(South)	57 6 S
4	ε Delphini	6 16 18·6	49 26	10 55
2–1	α Cygni	6 26 4·7	83 24	44 53
4	θ Capricorni	6 47 59·5	20 50	17 41 S
3	ζ Cygni	6 56 31·6*	68 17	29 46
3–2	α Cephei	7 4 18·8	(79 22 N)	62 6
3	β Aquarii	7 13 56·5	32 27	6 4 S
2–3	ε Pegasi	7 26 56·4	47 53	9 21
3	α Aquarii	7 48 13·2	37 39	0 52 S
4–3	γ Aquarii	8 4 1·0	36 34	1 58 S

Daylight stars.—Sirius (7.0 to 8.0 A.M.) 21° 57′. Subtract 7^{h} 29^{m} 5·9^{s}.
Arcturus (2.30 to 3.30 P.M.). See above.

The Planets.

Day	Mercury		Venus		Jupiter		Saturn	
	Transits A.M.	Alt.	Transits P.M.	Alt.	Transits P.M.	Alt.	Transits A.M.	Alt.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
1	—	—	1 58	34 42	0 22	45 27	7 45	60 50
3	11 48	43 3	1 58	33 41	0 16	45 17	7 37	60 55
5	11 35	44 11	1 59	32 39	0 10	45 8	7 30	60 55
7	11 22	45 17	2 0	31 38	0 3	44 58	7 23	60 54
9	11 11	46 16	2 1	30 38	A.M.	—	7 16	60 54
11	11 2	47 4	2 2	29 38	11 51	44 38	7 9	60 53
13	10 56	47 37	2 3	28 39	11 45	44 28	7 1	60 53
15	10 52	47 54	2 4	27 41	11 38	44 18	6 54	60 52
17	10 49	47 54	2 5	26 44	11 32	44 8	6 47	60 52
19	10 49	47 37	2 7	25 48	11 26	43 58	6 39	60 52
21	10 50	47 4	2 8	24 53	11 20	43 48	6 32	60 51
23	10 53	46 16	2 9	23 59	11 13	43 38	6 24	60 51
25	10 57	45 17	2 10	23 6	11 7	43 28	6 17	60 51
27	11 1	44 7	2 12	22 15	11 1	43 18	6 9	60 51
29	11 6	42 50	2 12	21 25	10 54	43 8	6 2	60 50

September 16 to 30.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	λ Sagittarii 13° 2′	α Lyræ (*Vega*) 77° 12′	α Aquilæ (*Altair*) 47° 6′	ε Pegasi 47° 53′	α Aquarii 37° 39′
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
16. Wed.	11 54 40·9	41 0	6 37 26·5	6 49 33·8	8 1 30·6	9 54 34·4	10 15 51·3
17. Thur.	11 54 19·7	40 37	6 33 30·6	6 45 37·9	7 57 34·7	9 50 38·5	10 11 55·4
18. Fri.	11 53 58·5	40 14	6 29 34·6	6 41 42·0	7 53 38·7	9 46 42·6	10 7 59·4
19. Sat.	11 53 37·4	39 51	6 25 38·7	6 37 46·0	7 49 42·8	9 42 46·7	10 4 3·5
20. Sun.	11 53 16·3	39 27	6 21 42·8	6 33 50·1	7 45 46·9	9 38 50·8	10 0 7·6
21. Mon.	11 52 55·2	39 4	6 17 46·9	6 29 54·2	7 41 51·0	9 34 54·9	9 56 11·7
22. Tues.	11 52 34·2	38 41	6 13 50·9	6 25 58·3	7 37 55·0	9 30 58·9	9 52 15·8
23. Wed.	11 52 13·3	38 17	6 9 55·0	6 22 2·3	7 33 59·1	9 27 3·0	9 48 19·9
24. Thur.	11 51 52·6	37 54	6 5 59·1	6 18 6·4	7 30 3·2	9 23 7·1	9 44 24·0
25. Fri.	11 51 32·0	37 30	6 2 3·2	6 14 10·5	7 26 7·3	9 19 11·2	9 40 28·0
26. Sat.	11 51 11·5	37 7	5 58 7·2	6 10 14·5	7 22 11·4	9 15 15·3	9 36 32·1
27. Sun.	11 50 51·3	36 44	5 54 11·3	6 6 18·6	7 18 15·4	9 11 19·4	9 32 36·2
28. Mon.	11 50 31·3	36 20	5 50 15·4	6 2 22·7	7 14 19·5	9 7 23·4	9 28 40·3
29. Tues.	11 50 11·6	35 57	5 46 19·5	5 58 26·7	7 10 23·6	9 3 27·5	9 24 44·4
30. Wed.	11 49 52·2	35 33	5 42 23·5	5 54 30·8	7 6 27·7	8 59 31·6	9 20 48·5

September 16 to 30.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

Sept. 16.—Sun sets $6^h\ 11^m$. Day ends $6^h\ 47^m$: Sidereal time at sunset $17^h\ 54^m$.

Mag.	Name of Star	Time to be added to Transit of λ Sagittarii			Altitude		Declination		
		h.	m.	s.	°	′	°	′	
3	λ Sagittarii	0	0	0·0*	13	2	25	29	S
1	α Lyræ (*Vega*)	0	12	7·3*	77	12	38	41	
4	β^1 Lyræ	0	24	52·8	71	46	33	14	
3	ζ Aquilæ	0	39	8·2		13	13	42	
3–4	δ Aquilæ	0	58	39·8	41	25	2	54	
3	γ Aquilæ	1	19	41·9	48	52	10	20	
1–2	α Aquilæ (*Altair*)	1	24	4·1*	47	6	8	34	
3	θ Aquilæ	1	44	12·8	37	22	1	9	S
3–4	α^2 Capricorni	1	50	30·1	25	38	12	54	S
2	α Pavonis	1	55	22·7	(South)		57	6	S
4	ε Delphini	2	6	30·1	49	26	10	55	
2–1	α Cygni	2	16	16·1	83	24	44	53	
4	θ Capricorni	2	38	11·0	20	50	17	41	S
3	ζ Cygni	2	46	43·1	68	17	29	46	
3–2	α Cephei	2	54	30·1	(79	22 N)	62	6	
3	β Aquarii	3	4	8·0	32	27	6	4	S
3	β^2 Cephei	3	5	49·5	(71	25 N)	70	4	
2–3	ε Pegasi	3	17	8·0*	47	53	9	21	
3	α Aquarii	3	38	24·8*	37	39	0	52	S
4–3	γ Aquarii	3	54	12·6	36	34	1	58	S
3–4	ζ Pegasi	4	14	10·0	48	46	10	14	
1–2	α Piscis Aust. (*Fomalh.*)	4	29	41·6	8	18	30	14	S
2	α Pegasi (*Markab*)	4	37	24·7	53	7	14	36	
3–4	γ Cephei	5	13	1·1	(64	29 N)	77	0	

Daylight stars.—Sirius (6 to 7 A.M.) 21° 57′. Subtract $11^h\ 38^m\ 53{\cdot}8^s$.
Arcturus (1.30 to 2.30 P.M.) 58° 18′. Subtract $4^h\ 9^m\ 48{\cdot}5^s$.
Vega (6 to 7 P.M.). See above.

September.

Mercury, in Leo, is very favourably situated for observation with the transit instrument during this month; may be seen in the morning about the middle of the month in the N.E. before sunrise. Its declination is 3° N. on the 1st, and 9° N. on the 21st.

Venus, in Virgo, transits about 2^h P.M., and may be seen at its transit by daylight. Its declination is 4° S. on the 1st, 9° S. on the 11th, and 14° S. on the 21st.

Mars, in Gemini, cannot yet be observed at its transit about 8^h A.M. Its declination is about 21° N.

Jupiter, in Leo, transits near the Sun, and cannot be observed with the transit instrument. Its declination is about 6° N.

Saturn, in Gemini, transits about 7^h A.M. Its declination is about 22° N.

A *Partial Eclipse* of the Moon on the 24th, partly visible at Greenwich. The first contact with the Penumbra takes place at $5^h\ 2^m$ A.M., the Moon setting at $5^h\ 45^m$ A.M., obscured by the Penumbra. Mag. of the eclipse (Moon's diam. = 1) 0·784.

MOON'S PHASES.

	d.	h.	m.	
Last Quarter	2	5	15	A.M.
New Moon	8	8	43	P.M.
First Quarter	16	6	15	A.M.
Full Moon	24	7	55	A.M.

The evenings from the 13th to the 30th are moonlight.

October 1 to 15.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Lyræ (*Vega*) 77° 12′	α Aquilæ (*Altair*) 47° 6′	α Aquarii 37° 39′	α Piscis. Aust. (*Fomalhaut*) 8° 18′	Polaris 52° 47′ (*North*)
							Mvinight
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1. Thur.	11 49 33·0	35 10	5 50 34·9	7 2 31·7	9 16 52·6	10 8 9·4	12 34 34·0
2. Fri.	11 49 14·2	34 47	5 46 38·9	6 58 35·8	9 12 56·6	10 4 13·5	12 30 38·3
3. Sat.	11 48 55·7	34 24	5 42 43·0	6 54 39·9	9 9 0·7	10 0 17·5	12 26 42·5
4. Sun.	11 48 37·5	34 0	5 38 47·1	6 50 44·0	9 5 4·8	9 56 21·6	12 22 46·6
5. Mon.	11 48 19·8	33 37	5 34 51·1	6 46 48·0	9 1 8·9	9 52 25·7	12 18 50·8
6. Tues.	11 48 2·4	33 14	5 30 55·2	6 42 52·1	8 57 13·0	9 48 29·8	12 14 55·0
7. Wed.	11 47 45·4	32 51	5 26 59·3	6 38 56·2	8 53 17·1	9 44 33·9	12 10 59·2
8. Thur.	11 47 28·8	32 28	5 23 3·3	6 35 0·3	8 49 21·2	9 40 38·0	12 7 3·5
9. Fri.	11 47 12·7	32 5	5 19 7·4	6 31 4·3	8 45 25·2	9 36 42·1	12 3 7·8
10. Sat.	11 46 57·0	31 43	5 15 11·5	6 27 8·4	8 41 29·3	9 32 46·2	11 59 12·1
11. Sun.	11 46 41·9	31 20	5 11 15·6	6 23 12·5	8 37 33·4	9 28 50·2	11 55 16·5
12. Mon.	11 46 27·1	30 57	5 7 19·6	6 19 16·6	8 33 37·5	9 24 54·3	11 51 20·8
13. Tues.	11 46 12·9	30 35	5 3 23·7	6 15 20·6	8 29 41·6	9 20 58·4	11 47 25·0
14. Wed.	11 45 59·2	30 13	4 59 27·8	6 11 24·7	8 25 45·6	9 17 2·5	11 43 29·2
15. Thur.	11 45 46·1	29 50	4 55 31·8	6 7 28·8	8 21 49·7	9 13 6·6	11 39 33·3

October 1 to 15.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

October 1.—Sun sets $5^h\ 37^m$. Day ends $6^h\ 13^m$. Sidereal time at sunset $18^h\ 18^m$

Mag.	Name of Star	Time to be added to Transit of α Lyræ	Altitude	Declination
		h. m. s.	° ′	° ′
1	α Lyræ (*Vega*) . .	0 0 0·0*	77 12	38 41
4	β^1 Lyræ	0 12 45·5	71 46	33 14
3	ζ Aquilæ . . .	0 27 1·0	52 13	13 42
3–4	δ Aquilæ . . .	0 46 32·6	41 25	2 54
3	γ Aquilæ . . .	1 7 34·8	48 52	10 20
1–2	α Aquilæ (*Altair*) . .	1 11 56·9*	47 6	8 34
3	θ Aquilæ . . .	1 32 5·7	37 22	1 9 S
3–4	α^2 Capricorni . . .	1 38 23·0	25 38	12 54 S
2	α Pavonis . . .	1 43 15·3	(South)	57 6 S
4	ε Delphini . . .	1 54 22·9	49 26	10 55
2–1	α Cygni	2 4 8·8	83 24	44 53
4	θ Capricorni . . .	2 26 3·9	20 50	17 41 S
3	ζ Cygni	2 34 35·9	68 17	29 46
3–2	α Cephei . . .	2 42 22·7	(79 22 N)	62 6
3	β^3 Cephei . . .	2 53 41·7	(71 25 N)	70 4
2–3	ε Pegasi . . .	3 5 0·9	47 53	9 21
3	α Aquarii . . .	3 26 17·8*	37 39	0 52 S
4–3	γ Aquarii . . .	3 42 5·6	36 34	1 58 S
3–4	ζ Pegasi	4 2 3·1	48 46	10 14
1–2	α Piscis Aust. (*Fomalh.*).	4 17 34·6*	8 18	30 14 S
2	α Pegasi (*Markab*) . .	4 25 17·8	53 7	14 36
4	γ Piscium . . .	4 37 26·0	41 11	2 40
3–4	γ Cephei . . .	5 0 53·9	(64 29 N)	77 0
4–5	δ Sculptoris . . .	5 9 4·7	9 46	28 46 S

Daylight stars.—Arcturus (12.30 to 1.30 P.M.) 58° 18′. Subtract $4^h\ 21^m\ 55{\cdot}5^s$.
Vega (5 to 6 P.M.). See above.

The Planets.

Day	Mercury		Venus		Jupiter		Saturn	
	Transits A.M.	Alt.	Transits P.M.	Alt.	Transits A.M.	Alt.	Transits A.M.	Alt.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
1	11 11	41 27	2 15	20 37	10 48	42 58	5 54	60 50
3	11 16	39 59	2 16	19 50	10 42	42 48	5 47	60 50
5	11 21	38 30	2 18	19 6	10 35	42 38	5 39	60 49
7	11 26	36 59	2 20	18 23	10 29	42 29	5 32	60 49
9	11 31	35 27	2 21	17 42	10 23	42 19	5 24	60 49
11	11 35	33 55	2 23	17 3	10 16	42 10	5 16	60 49
13	11 40	32 26	2 25	16 27	10 10	42 0	5 8	60 49
15	11 45	30 58	2 27	15 52	10 4	41 51	5 1	60 49
17	11 49	29 30	2 29	15 20	9 57	41 41	4 53	60 49
19	11 54	28 7	2 31	14 51	9 51	41 32	4 45	60 49
21	P.M.	—	2 34	14 24	9 45	41 23	4 37	60 49
23	0 2	25 25	2 36	13 59	9 38	41 14	4 29	60 49
25	0 7	24 9	2 38	13 37	9 32	41 4	4 21	60 49
27	0 11	22 56	2 40	13 18	9 25	40 55	4 13	60 49
29	0 15	21 45	2 43	13 1	9 19	40 46	4 5	60 49
31	0 20	20 39	2 45	12 47	9 12	40 38	3 57	60 49

October 16 to 31.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Lyræ (*Vega*) 77° 12′	α Aquilæ (*Altair*) 47° 6′	α Pegasi (*Markab*) 53° 7′	α Andromedæ 66° 59′	Polaris 52° 47′ (*North*)
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
16. Fri.	11 45 33·4	29 28	4 51 35·9	6 3 32·9	9 16 53·8	10 20 8·7	11 35 37·4
17. Sat.	11 45 21·4	29 6	4 47 40·0	5 59 36·9	9 12 57·9	10 16 12·8	11 31 41·4
18. Sun.	11 45 9·9	28 44	4 43 44·0	5 55 41·0	9 9 2·0	10 12 16·9	11 27 45·4
19. Mon.	11 44 59·1	28 23	4 39 48·1	5 51 45·1	9 5 6·1	10 8 21·0	11 23 49·4
20. Tues.	11 44 48·8	28 1	4 35 52·2	5 47 49·2	9 1 10·2	10 4 25·0	11 19 53·4
21. Wed.	11 44 39·2	27 40	4 31 56·2	5 43 53·2	8 57 14·3	10 0 29·1	11 15 57·4
22. Thur.	11 44 30·3	27 18	4 28 0·3	5 39 57·3	8 53 18·3	9 56 33·2	11 12 1·4
23. Fri.	11 44 22·0	26 57	4 24 4·4	5 36 1·4	8 49 22·4	9 52 37·3	11 8 5·5
24. Sat.	11 44 14·4	26 37	4 20 8·4	5 32 5·5	8 45 26·5	9 48 41·4	11 4 9·6
25. Sun.	11 44 7·5	26 16	4 16 12·5	5 28 9·5	8 41 30·6	9 44 45·5	11 0 13·7
26. Mon.	11 44 1·4	25 55	4 12 16·6	5 24 13·6	8 37 34·7	9 40 49·6	10 56 17·8
27. Tues.	11 43 56·0	25 35	4 8 20·6	5 20 17·7	8 33 38·8	9 36 53·7	10 52 21·8
28. Wed.	11 43 51·4	25 15	4 4 24·7	5 16 21·8	8 29 42·8	9 32 57·7	10 48 25·8
29. Thur.	11 43 47·6	24 55	4 0 28·8	5 12 25·8	8 25 46·9	9 29 1·8	10 44 29·7
30. Fri.	11 43 44·6	24 35	3 56 32·9	5 8 29·9	8 21 51·0	9 25 5·9	10 40 33·6
31. Sat.	11 43 42·3	24 16	3 52 36·9	5 4 34·0	8 17 55·1	9 21 10·0	10 36 37·3

October 16 to 31.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

October 16.—Sun sets $5^h\ 4^m$. Day ends $5^h\ 39^m$. Sidereal time at sunset $18^h\ 45^m$.

Mag.	Name of Star	Time to be added to Transit of α Lyræ			Altitude		Declination		
		h.	m.	s.	°	′	°	′	
1	α Lyræ (*Vega*)	0	0	0·0*	77	12	38	41	
3	ζ Aquilæ	0	27	1·1	52	13	13	42	
3–4	δ Aquilæ	0	46	32·8	41	25	2	54	
3	γ Aquilæ	1	7	34·9	48	52	10	20	
1–2	α Aquilæ (*Altair*)	1	11	57·1*	47	6	8	34	
3	θ Aquilæ	1	32	5·9	37	22	1	9	S
3–4	α^2 Capricorni	1	38	23·1	25	38	12	54	S
2	α Pavonis	1	43	15·1	(South)		57	6	S
4	ε Delphini	1	54	23·1	49	26	10	55	
2–1	α Cygni	2	4	8·8	83	24	44	53	
4	θ Capricorni	2	26	4·0	20	50	17	41	S
3	ζ Cygni	2	34	36·0	68	17	29	46	
3–2	α Cephei	2	42	22·4	(79	22 N)	62	6	
3	β Aquarii	2	52	1·2	32	27	6	4	S
2–3	ε Pegasi	3	5	1·1	47	53	9	21	
3	α Aquarii	3	26	18·0	37	39	0	52	S
4–3	γ Aquarii	3	42	5·9	36	34	1	58	S
3–4	ζ Pegasi	4	2	3·4	48	46	10	14	
1–2	α Piscis Aust. (*Fomalh.*)	4	17	34·9	8	18	30	14	S
2	α Pegasi (*Markab*)	4	25	18·1*	53	7	14	36	
4	γ Piscium	4	37	26·4	41	11	2	40	
3–4	γ Cephei	5	0	53·6	(64	29 N)	77	0	
4–5	δ Sculptoris	5	9	5·0	9	46	28	46	S
2	α Andromedæ	5	28	33·0*	66	59	28	27	

Daylight stars.—Arcturus (11.30 to 12.30 P.M.) 58° 18′. Subtract $4^h\ 21^m\ 55^s$.
Vega (4 to 5 P.M.). See above.

October.

Mercury, in Virgo, may be observed with the transit instrument during the first part of this month. Its declination is 3° N. on the 1st, 5° S. on the 11th, and 12° S. on the 21st.

Venus, in Libra and Scorpio, transits about 2^h P.M.; it may be seen in the S.W. after sunset. Its declination is 18° S. on the 1st, 21° S. on the 11th, and 24° S. on the 21st.

Mars, in Cancer, transits about 8^h A.M. Its declination varies from 19° N. to 15° N. during the month.

Jupiter, in Leo, may be observed in the telescope at its transit by daylight. Its declination is about 4° N.

Saturn, in Gemini, transits about 5^h A.M. Near the Moon on the 28th. Its declination is about 22° N.

MOON'S PHASES.

	d.	h.	m.	
Last Quarter	1	11	29	A.M.
New Moon	8	7	31	A.M.
First Quarter	16	1	21	A.M.
Full Moon	23	9	23	P.M.
Last Quarter	30	5	58	P.M.

The evenings from the 13th to the 29th are moonlight.

November 1 to 15.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Lyræ (*Vega*) 77° 12′	α Aquilæ (*Altair*) 47° 6′	α Pegasi (*Markab*) 53° 7′	α Andromedæ 66° 59′	Polaris 52° 47′ (*North*)
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1 Sun.	11 43 40·9	23 56	3 48 41·0	5 0 38·1	8 13 59·2	9 17 14·1	10 32 41·1
2. Mon.	11 43 40·3	23 37	3 44 45·1	4 56 42·1	8 10 3·2	9 13 18·2	10 28 44·9
3. Tues.	11 43 40·5	23 19	3 40 49·1	4 52 46·2	8 6 7·3	9 9 22·2	10 24 48·7
4. Wed.	11 43 41·5	23 0	3 36 53·2	4 48 50·3	8 2 11·4	9 5 26·3	10 20 52·5
5. Thur.	11 43 43·4	22 42	3 32 57·3	4 44 54·4	7 58 15·5	9 1 30·4	10 16 56·4
6. Fri.	11 43 46·2	22 24	3 29 1·4	4 40 58·5	7 54 19·6	8 57 34·5	10 13 0·3
7. Sat.	11 43 49·7	22 6	3 25 5·4	4 37 2·5	7 50 23·6	8 53 38·6	10 9 4·2
8. Sun.	11 43 54·1	21 49	3 21 9·5	4 33 6·6	7 46 27·7	8 49 42·7	10 5 8·1
9. Mon.	11 43 59·4	21 31	3 17 13·6	4 29 10·7	7 42 31·8	8 45 46·7	10 1 12·0
10. Tues.	11 44 5·5	21 15	3 13 17·7	4 25 14·8	7 38 35·9	8 41 50·8	9 57 15·7
11. Wed.	11 44 12·4	20 58	3 9 21·7	4 21 18·8	7 34 40·0	8 37 54·9	9 53 19·5
12. Thur.	11 44 20·2	20 42	3 5 25·8	4 17 22·9	7 30 44·0	8 33 59·0	9 49 23·2
13. Fri.	11 44 28·7	20 26	3 1 29·9	4 13 27·0	7 26 48·1	8 30 3·1	9 45 26·8
14. Sat.	11 44 38·2	20 10	2 57 34·0	4 9 31·1	7 22 52·2	8 26 7·2	9 41 30·4
15. Sun.	11 44 48·4	19 55	2 53 38·0	4 5 35·2	7 18 56·3	8 22 11·2	9 37 33·9

November 1 to 15.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

November 1.—Sun sets $4^h\ 32^m$. Day ends $5^h\ 10^m$. Sidereal time at sunset $19^h\ 16$.

Mag.	Name of Star	Time to be added to Transit of α Lyræ	Altitude	Declination
		h. m. s.	° ′	° ′
1	α Lyræ (*Vega*)	0 0 0·0*	77 12	38 41
3	γ Aquilæ	1 7 34·9	48 52	10 20
1–2	α Aquilæ (*Altair*)	1 11 57·1*	47 6	8 34
3	θ Aquilæ	1 32 5·9	37 22	1 9 S
3–4	α^2 Capricorni	1 38 23·2	25 38	12 54 S
4	ε Delphini	1 54 23·1	49 26	10 55
2–1	α Cygni	2 4 8·7	83 24	44 53
4	θ Capricorni	2 26 4·1	20 50	17 41 S
3–2	α Cephei	2 42 22·1	(79 22 N)	62 6
2–3	ε Pegasi	3 5 1·2	47 53	9 21
3	α Aquarii	3 26 18·1	37 39	0 52 S
4–3	γ Aquarii	3 42 6·0	36 34	1 58 S
3–4	ζ Pegasi	4 2 3·4	48 46	10 14
1–2	α Piscis Aust. (*Fomalh.*)	4 17 34·9	8 18	30 14 S
2	α Pegasi (*Markab*)	4 25 18·2*	53 7	14 36
4	γ Piscium	4 37 26·5	41 11	2 40
3–4	γ Cephei	5 0 53·2	(64 29 N)	77 0
4–5	δ Sculptoris	5 9 5·1	9 46	28 46 S
2	α Andromedæ	5 28 33·2*	66 59	28 27
3–4	ι Ceti	5 39 38·2	29 4	9 27 S
2–3	α Cassiopeiæ	6 0 2·0	(85 34 N)	55 55
2–3	β Andromedæ	0 29 14·9	73 32	35 1
2	α Ursæ Minor. (*Polaris*)	— — —*	(52 47 N)	88 42
3	θ Ceti	6 44 10·3	29 45	8 46 S

Daylight stars.—Arcturus (10.30 to 11.30 A.M.) 58° 18′. Subtract $4^h\ 21^m\ 54{\cdot}7^s$.
Vega (3 to 4 P.M.). See above.

The Planets.

Day	Mercury		Venus		Jupiter		Neptune	
	Transits P.M.	Alt.	Transits P.M.	Alt.	Transits A.M.	Alt.	Transits A.M.	Alt.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
1	0 22	20 7	2 46	12 41	9 9	40 33	0 49	55 43
3	0 26	19 5	2 48	12 32	9 3	40 25	0 41	55 42
5	0 31	18 8	2 51	12 25	8 56	40 16	0 33	55 41
7	0 35	17 14	2 53	12 21	8 49	40 8	0 25	55 40
9	0 40	16 25	2 55	12 20	8 43	40 0	0 17	55 39
11	0 45	15 40	2 57	12 21	8 36	39 52	P.M.	55 39
13	0 49	14 59	3 0	12 25	8 30	39 44	11 56	55 38
15	0 54	14 24	3 2	12 33	8 23	39 37	11 48	55 37
17	0 58	13 53	3 4	12 42	8 16	39 29	11 40	55 36
19	1 3	13 28	3 6	12 55	8 10	39 22	11 32	55 35
21	1 7	13 8	3 8	13 10	8 3	39 15	11 24	55 34
23	1 11	12 53	3 0	13 28	7 56	39 8	11 16	55 34
25	1 15	12 44	3 11	13 48	7 50	39 1	11 8	55 33
27	1 18	12 41	3 12	14 11	7 43	38 54	11 0	55 32
29	1 20	12 44	3 14	14 36	7 36	38 48	10 52	55 31

November 16 to 30.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	α Lyræ (*Vega*) 77° 12′	α Cygni 83° 24′	α Pegasi (*Markab*) 53° 7′	β Andromedæ 73° 32′	Polaris 52° 47′ (*North*)
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
16. Mon.	11 44 59·5	19 40	2 49 42·1	4 53 50·7	7 15 0·4	9 18 57·1	9 33 37·5
17. Tues.	11 45 11·3	19 25	2 45 46·2	4 49 54·8	7 11 4·4	9 15 1·2	9 29 41·1
18. Wed.	11 45 24·0	19 11	2 41 50·3	4 45 58·9	7 7 8·5	9 11 5·3	9 25 44·7
19. Thur.	11 45 37·5	18 57	2 37 54·3	4 42 2·9	7 3 12·6	9 7 9·3	9 21 48·4
20. Fri.	11 45 51·9	18 43	2 33 58·4	4 38 7·0	6 59 16·7	9 3 13·4	9 17 52·1
21. Sat.	11 46 7·0	18 30	2 30 2·5	4 34 11·1	6 55 20·7	8 59 17·5	9 13 55·8
22. Sun.	11 46 22·9	18 17	2 26 6·6	4 30 15·1	6 51 24·8	8 55 21·6	9 9 59·5
23. Mon.	11 46 39·6	18 4	2 22 10·6	4 26 19·2	6 47 28·9	8 51 25·7	9 6 3·1
24. Tues.	11 46 57·0	17 52	2 18 14·7	4 22 23·3	6 43 33·0	8 47 29·7	9 2 6·7
25. Wed.	11 47 15·3	17 40	2 14 18·8	4 18 27·3	6 39 37·0	8 43 33·8	8 58 10·3
26. Thur.	11 47 34·3	17 29	2 10 22·9	4 14 31·4	6 35 41·1	8 39 37·9	8 54 13·7
27. Fri.	11 47 54·0	17 18	2 6 26·9	4 10 35·5	6 31 45·2	8 35 42·0	8 50 17·1
28. Sat.	11 48 14·5	17 7	2 2 31·0	4 6 39·5	6 27 49·3	8 31 46·1	8 46 20·5
29. Sun.	11 48 35·7	16 57	1 58 35·1	4 2 43·6	6 23 53·3	8 27 50·1	8 42 23·8
30. Mon.	11 48 57·6	16 47	1 54 39·2	3 58 47·7	6 19 57·4	8 23 54·2	8 38 27·2

November 16 to 30.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

November 16.—Sun sets $4^h\ 8^m$. Day ends $4^h\ 47^m$. Sidereal time at sunset $19^h\ 51^m$.

Mag.	Name of Star	Time to be added to Transit of α Lyræ			Altitude		Declination		
		h.	m.	s.	°	′	°	′	
1	α Lyræ (*Vega*)	0	0	0·0*	77	12	38	41	
1–2	α Aquilæ (*Altair*)	1	11	57·2	47	6	8	34	
3–4	α^2 Capricorni	1	38	23·2	25	38	12	54	S
4	ε Delphini	1	54	23·1	49	26	10	55	
2–1	α Cygni	2	4	8·5*	83	24	44	53	
4	θ Capricorni	2	26	4·1	20	50	17	41	S
3–2	α Cephei	2	42	21·6	(79	22	N)	62	6
2–3	ε Pegasi	3	5	1·2	47	53	9	21	
3	α Aquarii	3	26	18·1	37	39	0	52	S
4–3	γ Aquarii	3	42	6·0	36	34	1	58	S
3–4	ζ Pegasi	4	2	3·5	48	46	10	14	
1–2	α Piscis Aust. (*Fomalh.*)	4	17	34·9	8	18	30	14	S
2	α Pegasi (*Markab*)	4	25	18·2*	53	7	14	36	
4	γ Piscium	4	37	26·5	41	11	2	40	
3–4	γ Cephei	5	0	52·0	(64	29	N)	77	0
4–5	δ Sculptoris	5	9	5·1	9	46	28	46	S
2	α Andromedæ	5	28	33·2	66	59	28	27	
3–4	ι Ceti	5	39	38·3	29	4	9	27	S
2–3	α Cassiopeiæ	6	0	2·0	(85	34	N)	55	55
2–3	βAndromedæ	6	29	15·0*	73	32	35	1	
2	α Ursæ Minor. (*Polaris*)	—	—	—*	(52	47	N)	88	42
3	θ Ceti	6	44	10·5	29	45	8	46	S
3–2	β Arietis	7	14	7·0	58	46	20	15	
2	α Arietis	7	26	29·1	61	27	22	55	

Daylight stars.—Arcturus (9.30 to 10.30 A.M.) 58° 18′. Subtract $4^h\ 21^m\ 54{\cdot}2^s$.
Vega (2 to 3 P.M.). See above.

November.

Mercury, in Libra and Scorpio, may be observed at its transit by daylight towards the end of the month, and may be seen in the S.W. after sunset. Its declination is 18° S. on the 1st, 23° S. on the 11th, and 25° S. on the 21st.

Venus, in Sagittarius, may be seen in the transit instrument. Its declination is about 26° S. during this month.

Mars, in Leo, transits about 7^h A.M. Its declination is about 12° N.

Jupiter, in Leo, may be observed at its transit about 8^h A.M. Its declination is about 1° N.

Saturn, in Gemini, transits about 3^h A.M. Its declination is about 22° N.

Neptune, between Aries and Taurus, may be observed at its transit about midnight. Its declination is about 17° N.

MOON'S PHASES.

	d.	h.	m.	
New Moon	6	9	3	P.M.
First Quarter	14	10	0	P.M.
Full Moon	22	9	39	A.M.
Last Quarter	29	1	57	A.M.

The evenings from the 11th to the 27th are moonlight.

December 1 to 15.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	ζ Cygni 68° 17′	α Pegasi (*Markab*) 53° 7′	α Arietis 61° 27′	α Ceti 42° 10′	Polaris 52° 47′ (*North*)
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1. Tues.	11 49 20·2	16 38	4 25 19·2	6 16 1·5	9 17 12·7	10 12 37·8	8 34 30·7
2. Wed.	11 49 43·4	16 29	4 21 23·3	6 12 5·6	9 13 16·7	10 8 41·9	8 30 34·2
3. Thur.	11 50 7·3	16 21	4 17 27·4	6 8 9·6	9 9 20·8	10 4 46·0	8 26 37·7
4. Fri.	11 50 31·7	16 13	4 13 31·4	6 4 13·7	9 5 24·9	10 0 50·1	8 22 41·2
5. Sat.	11 50 56·7	16 5	4 9 35·5	6 0 17·8	9 1 29·0	9 56 54·2	8 18 44·8
6. Sun.	11 51 22·3	15 58	4 5 39·6	5 56 21·9	8 57 33·1	9 52 58·3	8 14 48·2
7. Mon.	11 51 48·4	15 51	4 1 43·7	5 52 25·9	8 53 37·1	9 49 2·4	8 10 51·7
8. Tues.	11 52 15·0	15 45	3 57 47·7	5 48 30·0	8 49 41·2	9 45 6·4	8 6 55·1
9. Wed.	11 52 42·0	15 39	3 53 51·8	5 44 34·1	8 45 45·3	9 41 10·5	8 2 58·4
10. Thur.	11 53 9·4	15 33	3 49 55·9	5 40 38·2	8 41 49·4	9 37 14·6	7 59 1·7
11. Fri.	11 53 37·2	15 28	3 46 0·0	5 36 42·3	8 37 53·5	9 33 18·7	7 55 4·9
12. Sat.	11 54 5·3	15 24	3 42 4·0	5 32 46·3	8 33 57·6	9 29 22·8	7 51 8·1
13. Sun.	11 54 33·8	15 20	3 38 8·1	5 28 50·4	8 30 1·6	9 25 26·9	7 47 11·3
14. Mon.	11 55 2·6	15 16	3 34 12·2	5 24 54·5	8 26 5·7	9 21 31·0	7 43 14·6
15. Tues.	11 55 31·6	15 13	3 30 16·3	5 20 58·6	8 22 9·8	9 17 35·0	7 39 17·8

December 1 to 15.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

December 1.—Sun sets $3^h\ 53^m$. Day ends $4^h\ 34^m$. Sidereal time at sunset $20^h\ 35^m$.

Mag.	Name of Star	Time to be added to Transit of ζ Cygni	Altitude	Declination
		h. m. s.	° ′	° ′
3	ζ Cygni	0 0 0·0*	68 17	29 46
3–2	α Cephei	0 7 45·4	(79 22 N)	62 6
3	β Aquarii	0 17 25·3	32 27	6 4 S
2–3	ε Pegasi	0 30 25·3	47 53	9 21
3	α Aquarii	0 51 42·2	37 39	0 52 S
4–3	γ Aquarii	1 7 30·1	36 34	1 58 S
3–4	ζ Pegasi	1 27 27·5	48 46	10 14
1–2	α Piscis Aust. (*Fomalh.*)	1 42 59·0	8 18	30 14 S
2	α Pegasi (*Markab*)	1 50 42·3*	53 7	14 36
4	γ Piscium	2 2 50·6	41 11	2 40
3–4	γ Cephei	2 26 15·4	(64 29 N)	77 0
4–5	δ Sculptoris	2 34 29·1	9 46	28 46 S
2	α Andromedæ	2 53 57·3	66 59	28 28
3–4	ι Ceti	3 5 2·4	29 4	9 27 S
2–3	α Cassiopeiæ	3 25 25·9	(85 34 N)	55 55
2–3	β Andromedæ	3 54 39·1	73 32	35 1
3	θ Ceti	4 9 34·6	29 45	8 46 S
1	α Eridani (*Achernar*)	4 24 40·6	(South)	57 49 S
3–2	β Arietis	4 39 31·1	58 46	20 15
2	α Arietis	4 51 53·5*	61 27	22 55
4	ξ^2 Ceti	5 13 10·9	46 28	7 57
3–4	γ^2 Ceti	5 28 26·1	41 16	2 45
2–3	α Ceti	5 47 18·7*	42 10	3 38
2	α Persei	6 7 8·5	87 59	49 27

Daylight stars.—Arcturus (8.30 to 9.30 A.M.) 58° 18′. Subtract $6^h\ 56^m\ 29{\cdot}6^s$.
Vega (1 to 2 P.M.) 77° 12′. Subtract $2^h\ 34^m\ 35{\cdot}9^s$.

The Planets.

Day	Mercury		Venus		Saturn		Neptune	
	Transits P.M.	Alt.	Transits P.M.	Alt.	Transits A.M.	Alt.	Transits P.M.	Alt.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
1	1 21	12 52	3 15	15 3	1 50	60 55	10 43	55 31
3	1 21	13 6	3 16	15 32	1 41	60 55	10 35	55 30
5	1 20	13 25	3 17	16 3	1 33	60 56	10 27	55 29
7	1 16	13 49	3 17	16 36	1 24	60 56	10 19	55 28
9	1 10	14 17	3 18	17 11	1 16	60 57	10 11	55 28
11	1 0	14 49	3 18	17 48	1 7	60 57	10 3	55 27
13	0 48	15 24	3 19	18 26	0 59	60 58	9 55	55 26
15	0 32	16 1	3 18	19 6	0 50	60 58	9 47	55 26
17	0 14	16 39	3 16	19 47	0 41	60 59	9 39	55 25
19	A.M.	—	3 18	20 29	0 33	61 0	9 31	55 25
21	11 35	17 49	3 17	21 12	0 24	61 0	9 23	55 24
23	11 18	18 14	3 16	21 56	0 16	61 1	9 15	55 23
25	11 3	18 29	3 15	22 41	0 7	61 1	9 7	55 23
27	10 51	18 35	3 13	23 27	P.M.	—	8 59	55 22
29	10 41	18 30	3 12	24 12	11 46	61 3	8 51	55 22
31	10 35	18 19	3 10	24 59	11 37	61 3	8 43	55 22

December 16 to 31.

Mean Time of Transit at Greenwich.

1885	The Sun	Sun's Alt.	γ Aquarii 36° 34′	α Pegasi (*Markab*) 53° 7′	α Ceti 42° 10′	η Tauri 62° 16′	Polaris 52° 47′ (*North*)
	h. m. s.	° ′	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
16. Wed.	11 56 0·8	15 10	4 33 50·4	5 17 2·6	9 13 39·1	9 57 55·5	7 35 21·1
17. Thur.	11 56 30·2	15 8	4 29 54·5	5 13 6·7	9 9 43·2	9 53 59·6	7 31 24·5
18. Fri.	11 56 59·7	15 7	4 25 58·6	5 9 10·8	9 5 47·3	9 50 3·7	7 27 27·8
19. Sat.	11 57 29·4	15 5	4 22 2·7	5 5 14·9	9 1 51·4	9 46 7·8	7 23 31·2
20. Sun.	11 57 59·2	15 5	4 18 6·7	5 1 18·9	8 57 55·5	9 42 11·9	7 19 34·6
21. Mon.	11 58 29·1	15 4	4 14 10·8	4 57 23·0	8 53 59·6	9 38 16·0	7 15 37·9
22. Tues.	11 58 58·9	15 4	4 10 14·9	4 53 27·1	8 50 3·6	9 34 20·0	7 11 41·2
23. Wed.	11 59 28·8	15 5	4 6 19·0	4 49 31·2	8 46 7·7	9 30 24·1	7 7 44·3
24. Thur.	11 59 58·6	15 6	4 2 23·1	4 45 35·2	8 42 11·8	9 26 28·2	7 3 47·4
25. Fri.	12 0 28·4	15 8	3 58 27·1	4 41 39·3	8 38 15·9	9 22 32·3	6 59 50·5
26. Sat.	12 0 58·1	15 10	3 54 31·2	4 37 43·4	8 34 20·0	9 18 36·4	6 55 53·6
27. Sun.	12 1 27·7	15 12	3 50 35·3	4 33 47·5	8 30 24·1	9 14 40·5	6 51 56·7
28. Mon.	12 1 57·2	15 15	3 46 39·4	4 29 51·6	8 26 28·1	9 10 44·6	6 47 59·9
29. Tues.	12 2 26·4	15 19	3 42 43·5	4 25 55·6	8 22 32·2	9 6 48·6	6 44 3·1
30. Wed.	12 2 55·5	15 23	3 38 47·5	4 21 59·7	8 18 36·3	9 2 52·7	6 40 6·4
31. Thur.	12 3 24·2	15 27	3 34 51·6	4 18 3·8	8 14 40·4	8 58 56·8	6 36 9·6

December 16 to 31.

Transit of ADDITIONAL STARS. *Greenwich mean time.*

December 16.—Sun sets $3^h\ 49^m$. Day ends $4^h\ 32^m$. Sidereal time at sunset $21^h\ 30^m$.

Mag.	Name of Star	Time to be added to Transit of γ Aquarii			Altitude		Declination		
		h.	m.	s.	°	′	°	′	
4–3	γ Aquarii	0	0	0·0*	36	34	1	58	S
3–4	ζ Pegasi	0	19	57·4	48	46	10	14	
1–2	α Piscis Aust. (*Fomalh.*)	0	35	28·8	8	18	30	14	S
2	α Pegasi (*Markab*)	0	43	12·2*	53	7	14	36	
4	γ Piscium	0	55	20·5	41	11	2	40	
3–4	γ Cephei	1	18	43·7	(64	20 N)	77	0	
4–5	δ Sculptoris	1	26	59·0	9	46	28	46	S
2	α Andromedæ	1	46	27·1	66	59	28	28	
3–4	ι Ceti	1	57	32·3	29	4	9	27	S
2	β Ceti	2	21	43·3	19	54	18	37	S
2–3	β Andromedæ	2	47	9·0	73	32	35	1	
3	θ Ceti	3	2	4·5	29	45	8	46	S
1	α Eridani (*Achernar*)	3	17	10·2	(South)		57	49	S
3–2	β Arietis	3	32	1·1	58	46	20	15	
2	α Arietis	3	44	23·5	61	27	22	55	
4	ξ^2 Ceti	4	5	40·9	46	28	7	57	
3–4	γ^2 Ceti	4	20	56·2	41	16	2	45	
2–3	α Ceti	4	39	48·8*	42	10	3	38	
2	α Persei	4	59	38·5	87	59	49	27	
3	ε Eridani	5	10	58·1	28	40	9	51	S
3	π Tauri	5	24	5·2*	62	16	23	45	
3	γ^1 Eridani	5	36	3·1	24	41	13	50	S
1	α Tauri (*Aldebaran*)	6	12	37·5	54	48	16	17	
3	ι Aurigæ	6	32	45·9	71	30	32	59	

Daylight stars.—Arcturus (7.30 to 8.30 A.M.) 58° 18′. Subtract $8^h\ 3^m\ 59{\cdot}1^s$.
Vega (Noon to 1 P.M.) 77° 12′. Subtract $3^h\ 42^m\ 5{\cdot}8^s$.

December.

Mercury, in Sagittarius and Scorpio, at the beginning of the month is favourably situated for observation with the transit instrument, and may be seen in the S.W. after sunset. Its declination is 26° S. on the 1st, 24° S. on the 11th, and 21° S. on the 21st.

Venus, in Capricornus, may be seen in the telescope at its transit by daylight, and is visible in the S.W. after sunset. Its declination is 24° S. on the 1st, 21° S. on the 11th, and 17° S. on the 21st.

Mars, in Leo, transits about 6^h A.M. Its declination varies from 9° N. to 6° N.

Jupiter, in Leo, transits about 7^h A.M. Its declination is about 1° S.

Saturn, in Gemini, transits about midnight, and is becoming favourably situated for observation. Near the Moon on the 21st. Its declination is about 22° N.

Neptune, between Aries and Taurus, may be observed at its transit about 10^h P.M. Its declination is about 22° N.

MOON'S PHASES.

	d.	h.	m.	
New Moon	6	1	17	P.M.
First Quarter	14	6	22	P.M.
Full Moon	21	8	59	P.M.
Last Quarter	28	0	22	P.M

The evenings from the 11th to the 26th are moonlight.

ASTRONOMICAL DATA. GREENWICH (*approximate time*).

January.

Day	Day begins	Sun rises	Sun sets	Day ends	Sidereal time at 9 P.M. 1885	Sun's semi-diameter
	h. m.	h. m.	h. m.	h. m.	h. m. s.	s.
2	7 25	8 8	4 1	4 43	3 50 37·6	70·83
4	7 25	8 8	4 3	4 45	3 58 30·7	70·73
6	7 25	8 7	4 5	4 48	4 6 23·9	70·61
8	7 24	8 6	4 8	4 50	4 14 17·0	70·47
10	7 23	8 5	4 11	4 53	4 22 10·1	70·32
12	7 22	8 4	4 14	4 55	4 30 3·2	70·15
14	7 21	8 3	4 17	4 58	4 37 56·3	69·98
16	7 20	8 1	4 20	5 1	4 45 49·4	69·79
18	7 19	7 59	4 23	5 4	4 53 42·5	69·59
20	7 17	7 57	4 26	5 7	5 1 35·6	69·39
22	7 15	7 55	4 30	5 10	5 9 28·8	69·18
24	7 12	7 52	4 33	5 13	5 17 21·9	68·96
26	7 10	7 50	4 36	5 17	5 25 15·0	68·74
28	7 7	7 47	4 40	5 20	5 33 8·1	68·51
30	7 4	7 44	4 44	5 23	5 41 1·2	68·28

February.

2	7 1	7 40	4 49	5 27	5 52 50·9	67·94
4	6 58	7 36	4 53	5 30	6 0 44·0	67·71
6	6 54	7 33	4 56	5 34	6 8 37·1	67·48
8	6 51	7 30	5 0	5 37	6 16 30·2	67·25
10	6 47	7 26	5 4	5 41	6 24 23·3	67·03
12	6 44	7 22	5 7	5 44	6 32 16·4	66·81
14	6 41	7 19	5 11	5 47	6 40 9·5	66·59
16	6 37	7 15	5 15	5 51	6 48 2·6	66·39
18	6 34	7 11	5 18	5 54	6 55 55·7	66·19
20	6 30	7 7	5 22	5 57	7 3 48·8	66·00
22	6 26	7 3	5 25	6 1	7 11 41·9	65·81
24	6 22	6 59	5 29	6 4	7 19 35·0	65·63
26	6 18	6 54	5 33	6 7	7 27 28·1	65·46
28	6 14	6 50	5 36	6 11	7 35 21·2	65·30
—	—	—	—	—	—	—

ASTRONOMICAL DATA. GREENWICH (*approximate time*).

March.

Day	Day begins	Sun rises	Sun sets	Day ends	Sidereal time at 9 P.M. 1885	Sun's semi-diameter
	h. m.	h. m.	h. m.	h. m.	h. m. s.	s.
2	6 10	6 46	5 40	6 16	7 43 14·4	65·15
4	6 6	6 41	5 43	6 19	7 51 7·5	65·02
6	6 1	6 37	5 47	6 22	7 59 0·6	64·89
8	5 56	6 33	5 50	6 26	8 6 53·7	64·77
10	5 51	6 28	5 54	6 29	8 14 46·8	64·67
12	5 47	6 24	5 57	6 32	8 22 39·9	64·58
14	5 42	6 19	6 0	6 36	8 30 33·0	64·50
16	5 38	6 15	6 4	6 39	8 38 26·1	64·43
18	5 33	6 10	6 7	6 42	8 46 19·2	64·37
20	5 28	6 5	6 11	6 46	8 54 12·3	64·33
22	5 24	6 1	6 14	6 49	9 2 5·4	64·30
24	5 20	5 56	6 17	6 52	9 9 58·5	64·28
26	5 16	5 52	6 21	6 56	9 17 51·6	64·27
28	5 11	5 47	6 24	6 59	9 25 44·7	64·27
30	5 7	5 43	6 27	7 2	9 33 37·8	64·29

April.

2	4 59	5 36	6 32	7 8	9 45 27·5	64·33
4	4 54	5 31	6 35	7 12	9 53 20·6	64·37
6	4 49	5 27	6 38	7 15	10 1 13·7	64·43
8	4 45	5 22	6 41	7 19	10 9 6·8	64·50
10	4 40	5 18	6 45	7 22	10 16 59·9	64·58
12	4 36	5 14	6 48	7 26	10 24 53·0	64·66
14	4 31	5 9	6 52	7 29	10 32 46·1	64·76
16	4 27	5 5	6 55	7 33	10 40 39·2	64·86
18	4 22	5 1	6 58	7 37	10 48 32·3	64·98
20	4 18	4 56	7 2	7 40	10 56 25·4	65·10
22	4 13	4 52	7 5	7 44	11 4 18·5	65·23
24	4 9	4 48	7 8	7 48	11 12 11·6	65·36
26	4 4	4 44	7 11	7 51	11 20 4·7	65·50
28	3 59	4 40	7 15	7 55	11 27 57·8	65·65
30	3 55	4 36	7 18	7 58	11 35 50·9	65 81

ASTRONOMICAL DATA. GREENWICH (*approximate time*).

May.

Day	Day begins	Sun rises	Sun sets	Day ends	Sidereal time at 9 P.M. 1885	Sun's semi-diameter
	h. m.	h. m.	h. m.	h. m.	h. m. s.	s.
2	3 52	4 33	7 22	8 2	11 43 44·0	65·96
4	3 48	4 29	7 25	8 5	11 51 37·2	66·12
6	3 43	4 25	7 29	8 9	11 59 30·3	66·28
8	3 39	4 22	7 32	8 13	12 7 23·4	66·45
10	3 35	4 18	7 35	8 17	12 15 16·5	66·61
12	3 32	4 15	7 38	8 20	12 23 9·6	66·78
14	3 28	4 12	7 41	8 24	12 31 2·7	66·94
16	3 25	4 9	7 44	8 27	12 38 55·8	67·10
18	3 21	4 7	7 47	8 31	12 46 48·9	67·26
20	3 18	4 4	7 50	8 34	12 54 42·0	67·42
22	3 15	4 1	7 53	8 37	13 2 35·1	67·57
24	3 13	3 59	7 55	8 41	13 10 28·3	67·71
26	3 10	3 56	7 58	8 44	13 18 21·4	67·85
28	3 7	3 54	8 0	8 47	13 26 14·5	67·99
30	3 5	3 52	8 3	8 49	13 34 7·6	68·11

June.

2	3 2	3 50	8 6	8 54	13 45 57·3	68·28
4	3 0	3 49	8 8	8 56	13 53 50·4	68·38
6	2 58	3 47	8 10	8 58	14 1 43·5	68·47
8	2 57	3 46	8 11	9 0	14 9 36·6	68·55
10	2 56	3 45	8 13	9 2	14 17 29·7	68·62
12	2 56	3 45	8 14	9 4	14 25 22·8	68·68
14	2 55	3 44	8 16	9 5	14 33 15·9	68·72
16	2 54	3 44	8 17	9 6	14 41 9·1	68·75
18	2 54	3 44	8 17	9 7	14 49 2·2	68·77
20	2 54	3 44	8 18	9 8	14 56 55·3	68·78
22	2 55	3 45	8 18	9 9	15 4 48·4	68·77
24	2 55	3 45	8 19	9 9	15 12 41·5	68·75
26	2 56	3 46	8 19	9 9	15 20 34·6	68·72
28	2 57	3 47	8 19	9 9	15 28 27·7	68·67
30	2 58	3 48	8 18	9 8	15 36 20·9	68·61

ASTRONOMICAL DATA. GREENWICH (*approximate time*).

July.

Day	Day begins	Sun rises	Sun sets	Day ends	Sidereal time at 9 P.M. 1885	Sun's semi-diameter
	h. m.	h. m.	h. m.	h. m.	h. m. s.	s.
2	3 1	3 49	8 18	9 7	15 44 14·0	68·53
4	3 2	3 51	8 17	9 6	15 52 7·1	68·45
6	3 4	3 52	8 16	9 4	16 0 0·2	68·36
8	3 6	3 54	8 15	9 3	16 7 53·3	68·26
10	3 9	3 56	8 13	9 1	16 15 46·4	68·14
12	3 11	3 58	8 12	8 59	16 23 39·5	68·02
14	3 14	4 0	8 10	8 57	16 31 32·6	67·89
16	3 17	4 3	8 8	8 55	16 39 25·8	67·74
18	3 20	4 5	8 6	8 52	16 47 18·9	67·60
20	3 23	4 8	8 3	8 49	16 55 12·0	67·44
22	3 26	4 10	8 1	8 46	17 3 5·1	67·28
24	3 29	4 13	7 58	8 43	17 10 58·2	67·12
26	3 33	4 16	7 56	8 39	17 18 51·3	66·95
28	3 36	4 19	7 53	8 36	17 26 44·4	66·78
30	3 40	4 22	7 50	8 32	17 34 37·5	66·61

August.

2	3 45	4 26	7 45	8 27	17 46 27·2	66·36
4	3 49	4 29	7 41	8 23	17 54 20·3	66·18
6	3 52	4 32	7 38	8 19	18 2 13·4	66·01
8	3 55	4 35	7 34	8 15	18 10 6·5	65·84
10	3 59	4 38	7 31	8 11	18 17 59·6	65·67
12	4 2	4 41	7 27	8 7	18 25 52·7	65·51
14	4 5	4 45	7 23	8 3	18 33 45·9	65·35
16	4 9	4 48	7 19	7 59	18 41 39·0	65·20
18	4 13	4 51	7 15	7 54	18 49 32·1	65·05
20	4 17	4 54	7 11	7 49	18 57 25·2	64·90
22	4 21	4 58	7 7	7 44	19 5 18·3	64·77
24	4 24	5 1	7 3	7 39	19 13 11·4	64·64
26	4 28	5 4	6 58	7 35	19 21 4·5	64·52
28	4 31	5 7	6 54	7 31	19 28 57·6	64·41
30	4 34	5 10	6 50	7 27	19 36 50·7	64·31

ASTRONOMICAL DATA. GREENWICH (*approximate time*).

September.

Day	Day begins	Sun rises	Sun sets	Day ends	Sidereal time at 9 P.M. 1885	Sun's semi-diameter
	h. m.	h. m.	h. m.	h. m.	h. m. s.	s.
2	4 40	5 15	6 43	7 20	19 48 40·4	64·17
4	4 43	5 18	6 39	7 16	19 56 33·5	64·10
6	4 46	5 21	6 34	7 11	20 4 26·6	64·03
8	4 50	5 25	6 30	7 6	20 12 19·7	63·97
10	4 53	5 28	6 25	7 1	20 20 12·8	63·93
12	4 56	5 31	6 20	6 56	20 28 5·9	63·89
14	4 59	5 34	6 16	6 51	20 35 59·0	63·87
16	5 3	5 37	6 11	6 47	20 43 52·1	63·86
18	5 6	5 41	6 7	6 42	20 51 45·2	63·86
20	5 9	5 44	6 2	6 37	20 59 38·3	63·88
22	5 13	5 47	5 57	6 33	21 7 31·4	63·91
24	5 16	5 50	5 53	6 28	21 15 24·5	63·94
26	5 19	5 54	5 48	6 23	21 23 17·6	63·99
28	5 22	5 57	5 44	6 19	21 31 10·7	64·06
30	5 25	6 0	5 39	6 15	21 39 3·8	64·13

October.

2	5 28	6 3	5 34	6 10	21 46 56·9	64·22
4	5 32	6 7	5 30	6 5	21 54 50·0	64·32
6	5 36	6 10	5 25	6 0	22 2 43·1	64·43
8	5 40	6 13	5 21	5 56	22 10 36·2	64·55
10	5 43	6 17	5 17	5 52	22 18 29·3	64·69
12	5 46	6 20	5 12	5 48	22 26 22·4	64·83
14	5 49	6 24	5 8	5 43	22 34 15·5	64·98
16	5 52	6 27	5 4	5 39	22 42 8·6	65·15
18	5 55	6 30	4 59	5 35	22 50 1·8	65·32
20	5 59	6 34	4 55	5 31	22 57 54·9	65·51
22	6 2	6 37	4 51	5 27	23 5 48·0	65·70
24	6 5	6 41	4 47	5 23	23 13 41·1	65·90
26	6 8	6 44	4 43	5 20	23 21 34·2	66·11
28	6 12	6 48	4 39	5 16	23 29 27·3	66·33
30	6 15	6 51	4 35	5 13	23 37 20·4	66·55

ASTRONOMICAL DATA. GREENWICH (*approximate time*).

November.

Day	Day begins	Sun rises	Sun sets	Day ends	Sidereal time at 9 P.M. 1885	Sun's semi-diameter
	h. m.	h. m.	h. m.	h. m.	h. m. s.	s.
2	6 20	6 58	4 30	5 8	23 49 10·1	66·89
4	6 24	7 1	4 26	5 4	23 57 3·2	67·12
6	6 27	7 4	4 23	5 1	0 4 56·3	67·36
8	6 30	7 8	4 20	4 58	0 12 49·4	67·60
10	6 33	7 11	4 16	4 55	0 20 42·5	67·84
12	6 36	7 15	4 13	4 52	0 28 35·6	68·08
14	6 40	7 18	4 10	4 50	0 36 28·7	68·31
16	6 43	7 21	4 8	4 47	0 44 21·8	68·55
18	6 46	7 25	4 5	4 45	0 52 14·9	68·78
20	6 49	7 28	4 3	4 43	1 0 8·0	69·01
22	6 52	7 32	4 1	4 41	1 8 1·1	69·23
24	6 55	7 35	3 58	4 39	1 15 54·3	69·44
26	6 57	7 38	3 56	4 37	1 23 47·4	69·65
28	7 0	7 41	3 55	4 36	1 31 40·5	69·85
30	7 3	7 44	3 53	4 35	1 39 33·6	70·04

December.

2	7 6	7 47	3 52	4 34	1 47 26·7	70·20
4	7 8	7 50	3 51	4 33	1 55 19·8	70·36
6	7 10	7 52	3 50	4 32	2 3 12·9	70·51
8	7 13	7 55	3 49	4 31	2 11 6·0	70·63
10	7 15	7 57	3 49	4 31	2 18 59·2	70·75
12	7 17	7 59	3 49	4 31	2 26 52·3	70·85
14	7 18	8 1	3 49	4 32	2 34 45·4	70·94
16	7 20	8 3	3 49	4 32	2 42 38·5	71·00
18	7 21	8 4	3 50	4 33	2 50 31·6	71·05
20	7 22	8 5	3 50	4 34	2 58 24·7	71·08
22	7 23	8 6	3 51	4 35	3 6 17·8	71·09
24	7 24	8 7	3 52	4 36	3 14 11·0	71·09
26	7 25	8 8	3 54	4 37	3 22 4·1	71·07
28	7 26	8 8	3 55	4 38	3 29 57·2	71·02
30	7 26	8 8	3 57	4 40	3 37 50·3	70·96

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SPOTTISWOODE AND CO., NEW-STREET SQUARE
AND PARLIAMENT STREET

CLARK'S

PATENT IMPROVED

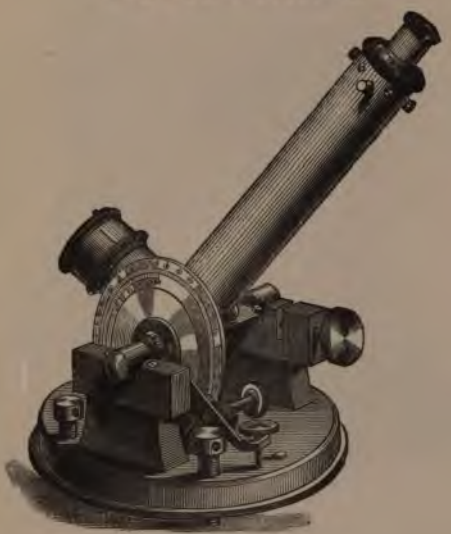
TRANSIT INSTRUMENTS

FOR OBTAINING TRUE TIME

DESCRIPTION, PRICE LISTS

AND

TESTIMONIALS



A. J. FROST

6 WESTMINSTER CHAMBERS, VICTORIA STREET,

LONDON, S.W.

CLARK'S

PATENT IMPROVED

TRANSIT INSTRUMENT.

THIS Transit Instrument is designed for the purpose of obtaining accurate time in all parts of the world. Its employment is of the simplest character, and does not require any knowledge of astronomy or the stars, or calculations of any kind. In ordinary hands it will easily give time true to the second.

The Instrument is of high quality, accurately adjusted, and well finished. The base is of cast iron, with large gun-metal levelling screws. It has a telescope 13 inches in length with object-glass $1\frac{1}{8}$ inch aperture. The axis is of gun-metal, 7 inches long, the trunnions resting on gun-metal bearings; the altitude or declination circle is $4\frac{1}{2}$ inches diameter, accurately divided into 4 quadrants of 90 degrees, with a vernier and spirit level reading to single minutes. It is furnished with a diagonal eye-piece with total reflecting prism, and three spider-web cross-wires, with collimating screws. There are two dark glasses for observations of the sun, and a 7-inch striding level of great delicacy is supplied with the Instrument. Its optical power is sufficient to show the larger stars and planets in full daylight. The illumination of the cross-wires at night is effected by a front reflecting diaphragm, and the Instrument is provided with a candle lantern carried on an adjustable support. The ordinary axial illumination (which is less effective) can be supplied if preferred.

Price, with Lantern &c. complete,

£9. 17s. 6d.

CLARK'S

PATENT IMPROVED

TRANSIT INSTRUMENT.

LARGE SIZE.

THIS Instrument is similar in every respect to the preceding, but is of larger size, and is intended for those who require great precision of time.

The telescope is 18 inches in length, and the object-glass $1\frac{3}{4}$ inch aperture. The striding level is 9 inches long, and the axis of the Transit Instrument is 9 inches between bearings. The illumination is of the usual axial character, with a candle lamp and small reflector in the interior of the telescope.

In both these Instruments the interior adjustments for collimator and focal distance are quite novel. Both Instruments are also provided with a diaphragm of contracted aperture, so that a meridian mark can be sharply focussed at a distance of 30 yards or even less, which is often an important advantage. They are secured down to their base by an excellent spring arrangement which allows of perfect adjustment of level while affording perfect security against all other movements. It may be levelled by either three screws or four, but the use of four screws is recommended on account of the greatly increased steadiness.

The especial convenience of these Instruments consists, however, in the means by which the altitude circle is set and

adjusted, and the telescope held steadily in position while the observation is being taken. This is effected by a tail-piece attached to the vernier circle by a clamping screw which rests against a stop on the uprights or the base plate, with a fine adjusting screw. By this means the star is brought perfectly on to the horizontal wire, and the telescope held firmly in position so as not to be liable to derangement or disturbance by a blow from the rim of the hat or other disturbing cause. The use of the small level is thus dispensed with, and the adjustments are all made indoors, none being required in the open air.

Price, with Lantern &c. complete,

£13. 13*s*.

CLARK'S

PATENT

WINDOW TRANSIT.

THIS Instrument is specially designed for fixing on a window-sill, but is at the same time equally adapted for use on a wall or pillar. Its focal length and optical power are the same as those of the ordinary Instrument, and the object-glass has the same aperture. For practical use it may be considered identical with the ordinary 13-inch Transit. It is, however, totally different in appearance, owing to the fact that the diagonal eye-

piece is dispensed with, and the prism is increased in size and placed in the axis, which is at this point enlarged, the telescope being bent at right angles. Everything in fact has been done to condense the Instrument and diminish its size. It packs into a much smaller compass than other forms, and the base, instead of being 10 inches × 5 inches × 8 inches in height, is circular, 6½ inches in diameter and 3 inches in height, and when covered with a flat zinc cap it is so small as to be scarcely noticeable. It is therefore peculiarly adapted for window use, and is without doubt the most convenient instrument for all ordinary purposes of obtaining time. Its collimation is not so easily affected as that of the ordinary form, and can only be tested by a suitable collimator or by the Pole Star; but as the collimation is carefully adjusted and tested before being sent out, and as it is not in the least liable to derangement, this strong and compact instrument is highly recommended for all practical purposes. Owing to the great reduction in its size and weight, the cost is less than that of other forms. It has the same adjustments for level and altitude as the other forms, and the illumination may be effected by an ordinary bull's eye lantern.

Price £7. 10*s*.

ADDITIONAL APPARATUS, IF REQUIRED.

	s.	d.
Clark's Treatise on the Transit Instrument	5	0
„ Manual	1	0
„ Transit Tables (annually)	2	6

Second-hand Ships' Chronometers of high quality from £15.

	13 inch s.	13 inch d.	18 inch s.	18 inch d.
Box fitted for Instrument Level, &c.	10	6	12	6
Box for Window Instrument, 10s.				
Meridian Mark	3	6	3	6
Pendulum, Beating Half-seconds	5	0	5	0
Lens for Reading Vernier, fixed on Instrument	7	0	8	6
Zinc Cover for Base of Instrument	5	6	7	6
Axial Side Illumination, when ordered	12	6	20	0
Spare Levels	~~14~~	~~0~~	~~15~~	~~0~~
Collimator	34	6	—	
Hard Stearine Candles, per doz.	1	6	1	6
Packing Case	2	6	3	6

MEAN TIME REGULATORS (8 day) of the highest quality and finish, with grid-iron compensated pendulum (39 inch), and all latest improvements, in handsome walnut cases, £14. 14s.

These clocks are well adapted for ordinary use in country houses; they are very handsome in appearance, and when well regulated will not vary more than 5 or 6 seconds in the year.

TESTIMONIALS.

From **R. J. LECKY, Esq., F.R.A.S.**

Lorton Terrace, Notting Hill.

MY DEAR SIR,—It gives me much pleasure to bear my testimony to the good qualities of your small and very beautiful Transit Instruments; their firm construction, simplicity, and ease of adjustment deserve every praise. I have an almost life-long experience in the use of the Transit Instrument, and I may safely say, without any undue egotism, that I should consider myself a very inferior observer if I did not 'fix' my time with a fair night's work with your smaller Instrument to the one-fifth of a second.

Yours truly,

A. J. FROST, Esq. ROBT. J. LECKY.

From **W. E. JACKSON, Esq.,** *Constantinople.*

Constantinople: August 28, 1883.

DEAR SIR, . . . With the Instrument I am very much pleased, and I do not find the adjustments at all difficult. I have a round stone pillar 12 inches in diameter at the top, and on this a piece of marble about 5 inches thick, cut to the shape of the iron stand. This I moved gradually until I found the meridian, and I am now cementing it to the stone pillar. The advantage of having it cut to the shape of the stand is that it allows the eye to be close to the eye-piece when watching zenith stars. At first I had it round, but I could only then see stars at a considerable angle from the zenith.

The definition by day and illumination of the wires by night are quite satisfactory. I have lately watched by daylight the transits of 'Aldebaran,' 'Saturn,' 'Capella,' 'Sirius,' 'Jupiter, 'Procyon,' 'Venus,' 'Sun,' 'Arcturus,' and 'Antares'; at night 'λ Sagittarius,' 'Vega,' 'ζ Aquilæ,' 'δ Aquilæ,' 'μ Sagittarii,' 'Altair,' 'a^2 Capricorni,' and 'ρ Capricorni.' I have already received considerable pleasure from it, and I shall certainly recommend it all I possibly can.

I am, dear Sir, yours very truly,

A. J. FROST, Esq., London. W. E. JACKSON.

From **RICKARD E. LLOYD, Esq.**

Pallasgrean, Ireland : November 14, 1882.

The little Instrument is now fixed. Works admirably. After a few trials to make all certain, I am sure that Transit-taking will be quite a simple matter, and in this out-of-the-way part of the country will be most useful in regulating our time.

From **RICKARD E. LLOYD, Esq.**

Portnard, Cappamore,
Pallasgrean, Co. Limerick : December 26, 1883.

DEAR SIR, . . . I may say that I am no astronomer, but I had no difficulty in adjusting the Transit Instrument by following Mr. Clark's directions. I am certain now that any possible error is less than half a second. I use the Instrument regularly once or twice a week for timing the clocks, and the ease with which that can be done is most satisfactory. I consider that I got very good value from you, and the small trouble I had in determining the true meridian has been fully repaid by the certainty with which I have ever since been able to fix the time—a very great consideration in the country at a distance from telegraph office and railway station.

Very truly yours,
A. J. FROST, Esq. RICKARD E. LLOYD.

From **EDWIN CLARK, Esq., M.I.C.E., F.R.A.S.**

The Observatory, Marlow : October 15, 1883.

MY DEAR SIR,—The small Transit I had of you has given excellent results. I have used a Transit for twenty years, but the great drawback to all portable Transit Instruments has been the unsteadiness of the supports. This is entirely removed by the solid cast frame and the spring attachment, and the adjustments are now remarkably stable.

This little Instrument is capable of great precision. With eight high and low stars observed the same night (and of course corrected for Azimuth), the greatest difference did not amount to five-tenths of a second ; absolute time may no doubt be found within three-tenths of a second by a careful observer ; while the

Tables render the process easy for the merest tyro. As a means of finding time the Instrument is all that could be desired, and the aperture is sufficient to well define the first-class stars by daylight.

Yours truly,

A. J. FROST, Esq. EDWIN CLARK.

From G. D. PLOMER, Esq.

48 Springfield Road, St. John's Wood: February 16, 1883.

I am much pleased with the general finish of the Instrument.

From R. RIMINGTON WILSON, Esq.

Broomhead Hall, Bolsterstone, Sheffield: September 10, 1883.

I cannot see how the Transit Instrument can fail to be a success. I will let you know my experience of it later on.

From the Rev. J. RATE, F.R.A.S., *Twickenham.*

September 6, 1883.

I have found Mr. Latimer Clark's Tables very useful in saving the trouble of keeping a chronometer regulated to Sidereal time for making observations, and of having then to translate Sidereal into Greenwich mean time when the latter is wanted. By the use of these Tables I can obtain the Greenwich mean time to within two or three tenths of a second.

From C. C. WALKER, Esq.

Lillieshall Old Hall, near Newport, Salop: November 5, 1883.

DEAR SIR,—The Transit Instrument is fixed on an iron pillar, and works extremely well; it has several ingenious contrivances, and the time can be taken to half a second. I have put the half-second pendulum in the front of the pillar, by drilling holes in it for the fulcrum at the top, and also for the plate against which the bead strikes; it is more convenient than on the stand, and requires to be firm. Altogether it is a very neat, cheap, and useful Instrument.

Yours faithfully,

A. J. FROST, Esq. C. C. WALKER.

From **R. P. GRACE, Esq.**

Harcourt House, Anerley, S.E.: November 9, 1883.

DEAR SIR,—At the risk of being troublesome I give you the result of a Transit taken to-day before looking at the Tables, and not taking into account fractions of a second. My watch was known to be twenty seconds fast.

1st Contact . . .	11	43	50		Table Time
2nd ,, . . .	11	46	10		11 44 24
Mean . .	11	45		add diff. Longt.	16
Known error, watch fast			20		
	11	44	40		11 44 40

I think this result is satisfactory, considering the low altitude of the sun, the very foggy state of the atmosphere, and the fact that the observation was taken by myself alone. At any rate it proves that your Transit Instrument gives an *easy* and *popular* way of obtaining correct time.

It has not been necessary to alter the Instrument either in Azimuth or level since first set by the Pole Star.

You can make any use you like of this letter, as it is a simple record of fact.

Yours truly,

A. J. FROST, Esq. R. P. GRACE.

From **Colonel G. L. TUPMAN, F.R.A.S.**

Harrow-on-the-Hill: November 23, 1883.

DEAR SIR,—I have frequently handled the Transit Instrument mounted in Mr. Edwin Clark's garden at Marlow. It possesses every requisite for the purpose for which it is intended. There is no doubt that, with ordinary care in attending to the adjustments, the time may be determined with less error than one second, small as such a quantity is.

I was much struck with the ingenious arrangement for firmly attaching the stand to the pier without inducing strains, a point which materially contributes to the stability of the adjustments, and therefore immensely facilitates 'finding the time.'

Yours very truly,

A. J. FROST, Esq. G. L. TUPMAN.

From **H. MELLISH, Esq.**

Hodsock Priory, Worksop: December 25, 1883.

DEAR SIR, . . . I have no hesitation in saying that the Transit Instrument has given me great satisfaction. I have mounted it on a strong stone pillar built on purpose in an open space in the garden. I have not been able yet to attain the accuracy mentioned by some of your correspondents, but I do not put this in any way down to the Instrument, but rather to my want of experience in the appreciation of small intervals of time. I find occasionally that I am liable to errors of about one second in an observation, which probably arises in transferring the time from the pendulum to the watch; but I have no doubt that with practice I shall get over a good deal of this.

Yours truly,

A. J. FROST, Esq. H. MELLISH.

From **JAMES POWRIES, Esq.**

Reswallin, Forfar, N.B.: December 24, 1883.

DEAR SIR,—The small Transit I have now got placed, and it gives every satisfaction.

I am, very truly yours,

A. J. FROST, Esq. JAS. POWRIES.

From **GEO. WEST, Esq.,** *Panama.*

Estacion de Panama,
Plaza de la Catedral: December 3, 1883.

DEAR SIR,—The Transit Instrument is to hand, and has proved to be very useful. I am now sending a daily time current as far north as Galveston, Texas, and as far south as Lima, Peru, in order to regulate the clocks at all the above Company's stations to correct New York time, the correct time here being obtained by means of your handy little Instrument.

I have also found it useful as a ready means of indentifying any of the stars, and it has afforded a new and interesting pastime for the dull evenings of Panama. . . .

Yours truly,

GEO. WEST,

A. J. FROST, Esq. *Assistant General Manager.*

From **JOHN COLES, Esq.**, *Astronomical Instructor, Royal Geographical Society.*

1 Savile Row, Burlington Gardens, W. : Jan. 9, 1884.

DEAR SIR,—Thinking you might like to see some results of observations taken with the small Transit Instrument you have lent me, I enclose an observation taken last night under most unfavourable circumstances as regards the atmosphere, but which nevertheless gives longitude (by moon-culminating stars) of the station with 3″ (three seconds of arc, as measured on the Ordnance Survey),* and it serves also as an example of all the work necessary to find longitude in any part of the world, provided the Instrument is fairly in the meridian, and that the observer has a watch which will go for (say) a quarter of an hour. The computation is made with tables which we have computed here from Nautical Almanac data.

You are quite at liberty to make any use you like of my observation, as it shows what the Instrument is capable of doing.

Yours truly,

JOHN COLES,

LATIMER CLARK, Esq. *Instructor, R.G.S.*

* Three seconds of arc=one-fifth of a second of time.

From **G. B. BUCKTON, F.R.S.**

Weycombe, Haslemere : March 31, 1884.

DEAR SIR,—I have much pleasure in stating my satisfaction as to the efficacy and convenience of the window Transit Instrument.

Though at present I have only got the correct time with a probable error of 4 seconds, I expect to reduce this one-half on the next bright night.

I shall be glad to recommend the Instrument to those who care for a little amateur astronomy, and who will be interested in observing some of the principal stars in broad sunlight.

I have collimated some new silk fibres successfully by means of a piece of 'looking-glass' fixed at 45° overhead, so as to reflect downwards an object on the horizon. The transit so can be reversed for verification in daylight.

You can use any part of this note that you see fit.

I am, dear Sir,

Yours faithfully,

A. J. FROST, Esq. G. B. BUCKTON.

From **R. P. GRACE, Esq.**

Harcourt House, Anerley : March 26, 1884.

DEAR SIR,—Shall be happy to send other lists, or any other particulars. It will at best be a very small return for the great pleasure I have had from the use of your beautiful Instrument.

Am very sorry to find that few of the stars which I give as observed in 'daylight' (that is, without lamp) can be seen in the smaller Instrument. All those given (except those marked 'not easy') are *well* within the grasp of the larger Instrument, and I took the time from *a* Tauri 20 minutes before sunset with ½-inch aperture, and ε Aurigæ (3 mag.) was quite bright 1 hour before sunset.

In consideration of the great value of these daylight observations, would it be possible to give these stars in the tables, and mark them as only available for the larger Instrument? In my opinion the power of observing them more than doubles the value of the Instrument.

The alteration in Azimuth of which I spoke is caused by the action of the levelling screw, its turning twisting the stand from E. to W. or from W. to E. as the case may be.

The stop-watch used is particularly fitted for the purpose, personal error being almost entirely got rid of, and it can be easily read to $\frac{1}{10}$ of a second. I showed it to Dr. B. W. Richardson the other day, and he said that he never saw anything so good, and would get one directly. It is easy with it to take the difference between two chronometers to $\frac{1}{5}$ or even $\frac{1}{10}$ of a second. I will bring it to Westminster and show you it when you have a few minutes to spare.

I am, &c.,

LATIMER CLARK, Esq. R. P. GRACE.

From **T. R. CLAPHAM, Esq.**

Austwick Hall, near Clapham, Lancaster:
May 24, 1884.

MY DEAR SIR,—I do not know if I told you in my last how I got on with the beautiful little 18-inch Transit Instrument I

got from you on the 12th April. Below I give you a few of my progressive steps.

* * * * * *

This evening I took my two friends

	H.	M.	S.
γ Ursæ Mag.	7	45	56-20
β Corvi.	8	26	24-54

I give these to show how easily they were seen so soon after sunset. I am very much pleased with the instrument. It has opened out a pleasant occupation for evening hours, besides being most useful in checking any error in a standard regulator clock I have lately erected.

* * * * * *

Believe me, dear Sir,
Yours faithfully,
T. R. CLAPHAM.

LATIMER CLARK, Esq.

From **Colonel G. L. TUPMAN**, *Sec. F.R.A.S.*

College Road, Harrow-on-the-Hill: Feb. 11, 1884.

MY DEAR SIR,—Last night I obtained a complete set of stars with the small Transit, which affords a crucial test of what the Instrument is capable.

The crude observations are as follows:

Level Error Lamp W. + 2″, 0″, 0″, 0″.
„ „ „ E. 0″, 0″, 0″, 0″.

Reduction from mean wire to centre wire 0″·8 positive with lamp W. Adopted Azimuth error + 38″
„ Collimation „ 0

	A N	Clock Time Mean Wire	Merid. Pass	R A	Clock corrn.	
		h. m. s.	s.	s.	s.	
ξ^1 Canis . .	75°	6 27 27·2	29·91	3·18	−26·7	
50 Aur . . .	9	6 31 31·0	31·60	5·30	−26·3	Lamp
Sirius . .	68	6 40 28·6	31·12	3·93	−27·2	west
16 Lynx . .	6	6 49 38·1	38·59	11·78	−26·8	
γ Canis . .	67	6 58 56·7	59·06	32·61	−26·5	
Aur . . .	12	7 4 9·2	9·80	43·06	−26·7	
63 Canis . .	76	7 14 19·8	22·50	56·05	−26·4	Lamp
30 Castor . .	19	7 27 39·9	40·84	14·20	−26·6	east.
Pupp . .	78	7 34 30·3	33·02	6·56	−26·5	
K Pollux . .	23	7 38 41·0	42·10	15·26	−26·8	

Mean of 2 high stars Lamp W. $6^h\ 40^m - 26{\cdot}55^s$
" " 3 " " " E. $7^h\ 24^m - 26{\cdot}74^s$
Known hourly rate of clock ·08ˢ (*i.e.* gaining).

I am very greatly surprised at these results, because my illuminating lamp was blown out before I began, and I was obliged to hold the other lamp in my hand for every Transit, which tends to distract one, and the wires * were coarse silk fibre, behind which small stars were concealed for nearly a whole second of time.

The observations bring into notice the good features of the Instrument, viz. the equality and true form of the pivots (in relation to the optical power of the telescope), the uniformity of the illumination of the field, and the power of the Instrument to determine time accurately. The stability of the adjustments is all that can be desired, enabling the time to be found from a single observation within a second.

Three of my stars last night are in Mr. Clark's tables ; it is noticeable that any one of them would have given the Greenwich mean time within 6-10ths of a second !

Yours, &c.,

A. J. FROST, Esq. G. L. TUPMAN.

* These wires were put in by Col. Tupman for temporary purposes.

From **Dr. E. J. SPITTA, M.D., F.R.A.S.**

Ivy House, Clapham Common, S.W. :
April 29, 1884.

DEAR SIR,—I have much pleasure in informing you I have had no difficulty with the little Transit I purchased from you the other day. Taking the interval method I have no appreciable error between altitude 77.28 and 27.57 ; and only a slight one—about $\frac{7}{10}$ of a second—between 27.57 and 88.25. This is with one night setting.

Yours truly,

To A. J. FROST, Esq., EDMUND J. SPITTA.
Westminster Chambers, S.W.

"F.R.A.S." in the "English Mechanic," November 7, 1884, writes:—

Mr. Latimer Clark has done excellent service to one branch of practical astronomy by the production of his very cheap and excellent Transit Instrument. Would that someone else would give us other optical apparatus of equal efficiency at a correspondingly economical rate.

From **HENRY YOOL, Esq., J.P.**

Oakfield, Weybridge: November 15, 1884.

DEAR SIR,—The small Transit I had of you continues to give me satisfaction. I much appreciate the facility with which true time may be found during the hours of twilight, when other meridian instruments, such as the Dipleidoscope, cannot be used. The adjustments are so simple, and the Instrument so firm, that with ordinary care no one should find it difficult to fix it, so as to give the time to a simple second accurately. It having for many years been my practice to set my clocks by observations of the sun and stars, I may add that I find your Instrument to be more accurate and convenient than any I have previously used.

Yours very truly

HENRY YOOL.

To A. J. FROST, Esq.

From **W. E. KILBURN, Esq.**

St. Laurence, Ventnor, Isle of Wight:
November 26, 1884.

DEAR SIR,—I have now had your Transit Instrument of the window form mounted on my bedroom window for nearly a year, and in this clear climate it is so available for observation that I use it nearly every night.

I will quote three examples to show what accuracy may be attained when the Transit is carefully levelled. They were taken

May 22, when the chronometer had been adjusted by the Portsmouth drop of Ball.

The transit of the star across the meridian wire was taken with my chronograph watch.

Time by Table.	Transit.
ϵ Virginis 50° 6′	
8·57′·52″·93	8·57′·53
α Virginis 27° 57′	
9·20·30·37	9·20·29
η Bootis 57°·30	
9·50·29·94	9·50·29·95

I have derived much amusement and pleasure from your little Instrument, the manipulation of which is so simple. It is very compact, easy of adjustment and, considering the excellent workmanship, very reasonable in price, and only requires to be more known.

Yours very truly

W. E. KILBURN.

A. J. FROST, Esq.

From **LOUIS J. CROSSLEY, F.R.A.S.**

Halifax : November 24, 1884.

Last night and Saturday night I took some forty observations (Window Transit) the greatest difference was only 0″·74, which is of course very good.

From **LOUIS J. CROSSLEY, F.R.A.S.**

Moorside, Halifax : November 28, 1884.

DEAR SIR,—Referring to my previous letter, I now enclose you copies of two evenings' work of Transit observations with your small (Window) Instrument, which, though hardly accurate enough to please an Astronomer, are sufficiently near the mark to suit that class of observer for whom the Instrument is designed.

I have had larger Transit Instruments, but Clark's little Instrument is so handy in all its arrangements that I should be sorry to change it for one of a larger calibre.

I am yours truly

LOUIS J. CROSSLEY.

A. J. FROST, Esq.

From G. M. WHIPPLE, Esq., F.R.A.S., *Superintendent Kew Observatory.*

Kew Observatory: October 9, 1884.

I am very pleased with Latimer Clark's Transit Tables. We keep our clocks at this observatory to Greenwich mean time, and I find that the assistants greatly prefer these Tables to the Nautical Almanac, which has almost dropped out of use here for ordinary purposes.

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